THE

NATIVE FLOWERS AND FERNS

OF THE UNITED STATES

IN THEIR BOTANICAL, HORTICULTURAL, AND POPULAR ASPECTS.

BY

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ILLUSTRATED BY CHROMOLITHOGRAPHS

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PREFACE TO SERIES II.

WHEN the first series of "The Flowers and Ferns of the United States" was issued, the hope was expressed that although that work should be complete in itself, the public would welcome another, or even successive series; until, peradventure, the whole Flora of the United States should be included. It is pleasant to the author to know that part of this hope is realised, indeed all of the hope that can be realised up to the present time.

Not the least among the author's gratifications is the complimentary manner in which the work has been received by his botanical associates. It was a task rarely attempted, to bring exact botanical knowledge to a level with popular comprehension,—to give it a place among a great variety of the more cultivated branches of knowledge,—and, above all, to accommodate such a work to the popular purse. That this could be successfully accomplished the author had the courage to hope, but he was scarcely prepared for the cordiality with which eminent men of science have received this people's work as an acceptable contribution to scientific literature. Amongst these the author has especially to make his acknowledgments to Professor Asa Gray, who in "Silliman's Journal of the Arts and Sciences" for May, 1879, compares the drawings not unfavorably with those of Mr. Sprague, who for many years has been at the head of botanical drawing in this country. Considering the very low price at which this work is supplied, the fact that Professor Gray should have been led to compare it with the best and most expensive botanical work in our country, must be accepted as very high praise.

We may now only say that while the publication of the work has been transferred to the American Natural History Publishing Company, Limited, of Philadelphia, an association organized primarily for the purpose, Messrs. Prang & Co.'s excellent artist, Mr. Alois Lunzer, will still make

the drawings, and the same well-known firm continue to execute the Lithographic plates. The same assistance will be extended by numerous correspondents all over the United States; and with the increased love of the task which the success of the first venture brings to the author, he hopes to make this second "General View of the Native Flowers and Ferns of the United States," at least as interesting as the first.

Special acknowledgments of friendly aid will appear as the work progresses; but more than this is due to Professor C. S. Sargent, of the Cambridge Botanic Garden, to Mr. Jackson Dawson, the gardener at the Arnold Arboretum of the Bussey Institute, and to Mr. John H. Redfield, the conservator of the Herbarium of the Academy of Natural Sciences of Philadelphia, for continuous and generous assistance on frequent occasions.

THOMAS MEEHAN.

GERMANTOWN, PHILADELPHIA, May, 1879.

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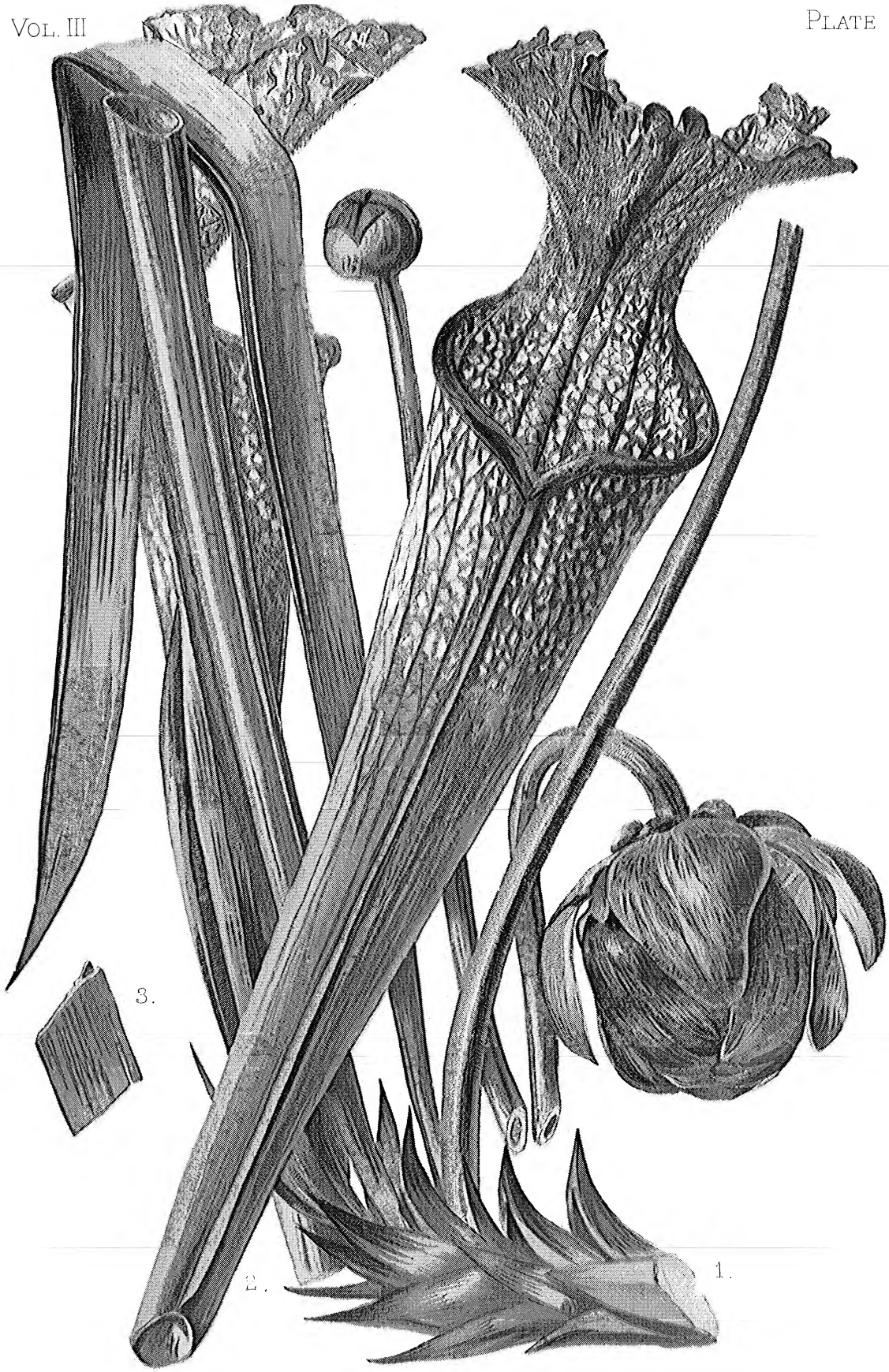

SARRACENIA DRUMMONDII.

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SARRACENIA DRUMMONDII.

DRUMMOND'S PITCHER-PLANT.

NATURAL ORDER, SARRACENIACEÆ.

SARRACENIA DRUMMONDII, Croom. — Leaves elongated, erect, trumpet-shaped, narrowly winged; lamina erect, rounded, short-pointed, hairy within, and like the upper portion of the tube white, variegated with reticulated purple veins. Leaves two feet long. Scapes longer than the leaves. Flowers three inches wide. (Chapman's *Flora of the Southern United States.* See also Wood's *Class-Book of Botany*, under the name of *S. Gronovii*, var. *Drummondii.*)

LONGFELLOW, in describing an old-time slave hiding from his pursuers in a southern swamp, says:

"Where will-o'-the-wisps and glow-worms shine,
In bulrush and in brake:
Where waving mosses shroud the pine,
And the cedar grows, and the poisonous vine
Is spotted like the snake:

"Where hardly a human foot could pass,
Or a human heart would dare,
On the quaking turf of the green morass
He crouched in the rank and tangled grass,
Like a wild beast in his lair."

It is not often that a poet writing with one subject only in view, at the same time happens to paint the portrait of something entirely absent from his mind. Yet every one who has collected Drummond's pitcher-plant will recognize a very fair picture of it amidst its surroundings in the lines quoted. It is a carnivorous plant, secreting in its pitcher-like leaves water into which insects are enticed, drowned, and eaten, as some botanists say. Besides growing among poisonous vines spotted like the snake, it is itself spotted; and just where the waving "Spanish moss" shrouds the pine, and in swamps where a human foot can

scarcely pass, it seems as like a wild beast as it "crouches" and waits for its prey as any plant can be. The genus is confined wholly to the Atlantic portion of the United States, and because of their very remarkable form must have been among the first of America's plants to receive marked attention from the white man on his arrival in the new world. It is believed to have been referred to by John Henry Bauhin, who published a history of plants in Switzerland, about the year 1650. The name *Sarracenia* is, however, of comparatively recent origin, having been given to the genus by Tournefort, a distinguished French botanist who flourished at the opening of our present century, in honor of Dr. Sarrazin, whom Milne calls "an ingenious Frenchman, and who introduced several Canadian plants into European gardens." Our text-books tell little more than this of him. Gray's "School Botany" merely says, "named for Dr. Sarrasin, of Quebec," and this is repeated in the same author's "Manual," except that the name is spelled Sarrazin. Professor Wood makes it "Dr. Sarrazen," so that the student has the choice of three orthographic forms. The Botanical Editor of Rees' "Encyclopædia" uses the form employed by Professor Gray in the "Manual," and does not seem to think that the credit of introducing "several Canadian plants" does him justice, for he gives the following account of him: "Sarracenia was so named by Tournefort, in honor of his friend, Dr. Sarrazin, of Quebec, who collected numerous plants in Canada, specimens of which are still in the Herbarium of the Museum of Natural History at Paris. While they lay there for ages unnoticed, the discovery of the same plants has been attributed to more recent travellers, who, indeed, could know nothing of Dr. S.'s acquisitions."

Having given some account of the origin of its botanical name, we may devote a short space to its common one of "Side-saddle flower," by which many of the family, as well as this particular species, are often known. The stigma of the *Sarracenia* consists of a broad plate; or, rather, there are "five stigmas united into a large peltate persistent membrane, covering the

ovary and stamens," as Professor Wood explains it. When the flower is fully expanded and recurved, the petals seem to hang between the up-curved angles of this persistent membrane, which membrane, according to Curtis, in the "Botanical Magazine," is "like a side-saddle, the petals hanging out from the angles like a lady's legs." Nuttall, however, does not seem to agree with this account, or that "Side-saddle flower" is even an American name. He says: "The most curious plant of the class Polyandria" (the Linnæan system prevailed in that day, and *Sarracenia* was then referred to this class) "is undoubtedly the peculiar North American genus *Sarracenia*, termed in England the Side-saddle flower, or rather leaf, as the resemblance only exists there to the old-fashioned side-saddle." One would judge from this expression of Nuttall's that the name of "Side-saddle" flower was not the common one by which it was known in this country, but was given to it in England. Yet this hardly agrees with Gronovius' "Flora Virginica," wherein is a note attributed to Clayton, of Virginia, which says,—he is evidently referring to the *Sarracenia variolaris*,—"This is commonly called Side-saddle flower; and in North Carolina, the Trumpet flower."

The name of *Drummondii* was given to this species by Croom, a very promising American botanist, who collected industriously through the Southern States, but whose useful career was cut short by a marine accident; and it is a little remarkable that Drummond, an enthusiastic Scotch collector, the one for whom the plant was named, should also have died at Havana, far away from home and friends, when on a collecting tour. Thus, Croom and Drummond, both in a measure victims to science, happily have their names associated in the history of this beautiful flower.

One of the most interesting facts connected with our plant is its fly-catching power, already referred to, which this species has in common with other *Sarracenias*. There is not only the secretion of water in the pitcher-like leaves, but a secretion of sweet liquid is found on the surface, which it is believed is in pursu-

ance of a design of nature to allure insects to destruction. They come for the honeyed juice, which is supposed to intoxicate them, when they fall into the little well of water, are drowned, and then consumed by the plant. "Drummond's Side-saddle flower" has figured particularly in this character. In "Silliman's Journal," for 1873, Dr. Gray says: "*Sarracenia Drummondii* is the species which most closely resembles *S. flava* in the shape and structure of the pitcher. We now learn from a letter addressed by Dr. Chapman to Mr. Canby, that the former is well aware of a similar (sweet) secretion in that species. 'On the inside of the hood,' he writes, 'there is a very faintly sweetish secretion, scarcely perceptible to the taste, which is very attractive to insects; and as I do not detect any of this within the tube I wonder how it is so many insects are entrapped, since they could easily fly away from the open hood.'"

"Drummond's Side-saddle flower" is found in the seaboard States, from Virginia to Florida. It is a very variable species, and this induced Professor Wood to group a number of varieties under one name—*S. Gronovii.* Among the variations is one with a pure white pitcher; that is to say, without the colored veining. This is known to florists as *Sarracenia Drummondii alba;* and as the flower remains of a beautiful red, the contrast is pleasing, and the variety is highly prized in England.

EXPLANATIONS OF THE PLATE.—1. Root-stock with flowers and pitcher-like leaves. 2. Upper section of trumpet-like leaf. 3. Enlarged portion of a wing of the leaf.

ENGELMANNIA PINNATIFIDA

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ENGELMANNIA PINNATIFIDA.

CUT-LEAVED ENGELMANN FLOWER.

NATURAL ORDER, COMPOSITÆ.

ENGELMANNIA PINNATIFIDA, Torrey and Gray.—A perennial branching, rough and hirsute herb with branching stems, corymbose paniculate at the summit, and bearing several small heads on slender peduncles. Leaves alternate, strigose, oblong or ovate lanceolate, irregularly pinnatifid, with the segments lanceolate or linear (the lower longest or divaricate), sessile, the radical petiolate and bipinnatifid. Rays yellow, tardily deciduous, pubescent externally. Heads many-flowered; the ray flowers equal in number to the inner scales of the involucre (eight to ten) and situated in their axils, ligulate, pistillate; involucre in three series, coriaceo-chartaceous, broadly ovate or obovate, appressed, the exterior shortest, all abruptly narrowed into a foliaceous lanceolate or linear spreading appendage, the exterior exceeding the scale itself in length. Receptacle flat; the chaff persistent, chartaceous, with foliaceous and hairy tips, partly involute and enclosing the sterile flowers; the outer series lanceolate acute, two firmly adherent to the base of each involucral scale; the others very narrowly linear, rather obtuse. Corolla of the ray with an oblong exserted sessile ligule; of the disc dilated upwards, fine-toothed, the teeth somewhat hairy, style in the sterile flowers undivided hispid. Achenia of the ray equal in size to the concave inner involucral scales to which they are applied, oval-obovate, obcompressed, convex and carinate externally, flat or concave, and one-ridged on the inside, scabrous pubescent, not winged or toothed, crowned with two small scarious lanceolate concave marcescent squamellæ, which are more or less united at the base, hispid and fringed; those of the disc filiform, abortive, with a minute coroniform pappus. (Torrey and Gray's *Flora of North America.*)

WHEN proposing to ourselves to prepare the present work, it was not our intention to make it botanical in its strictest sense, but that while botanically accurate, it should rather be a work for the whole people. Hence it was decided to give only the characters of the species in full, confining the text to those facts in relation to the genera and the orders, which might serve to illustrate some general lesson. By the long quotation we have now given from Torrey and Gray, it might be supposed we had forgotten this original plan, and the long paragraph of "hard words" may startle some who have

not advanced far into botanical technicalities. But the fact is, that even from the popular standpoint, it is a piece of good fortune that we have been obliged to make this long quotation, as it offers a chance for some popular lessons, not often afforded to us, in relation especially to the structure of composite, or Aster-like plants.

In the first place we may say, that *Engelmannia pinnatifida* is the only known species of the genus, and as there is no other to compete with it for family honors, no specific characters are given. The generic character includes the specific to some extent, and makes a specific description unnecessary. Hence, what we have given shows how little the description of a species may have to do with a plant's essential character, and this affords a good lesson. But the main one is to note with what accuracy a careful botanist can describe a plant, and then the faithfulness with which a good artist can reproduce an original. Occasionally an artist gets some help in his study from a botanical description, and may be tempted to make his drawing agree therewith when perhaps the plant before him would scarcely warrant it. This may arise from a fear that he may not have seen the parts exactly as they are, or not have had a "typical" form to draw from. In this instance our artist had nothing but the living plant to work by, and it is interesting to note how the details given fit in with the botanical description of the learned authors quoted. The rough and hirsute character of the herb is very well shown. The corymbous character (the flower stalks all coming out nearly together and all about the same length) is seen at Fig. 1. The alternate leaves show at Fig. 2, 2, and they have the exact form and characters described; the root leaf (3) being petiolate or on a stalk, and the upper one (4) being sessile. The manner in which the rays are tardily deciduous is well shown at 5 by the three lingering petals on the faded flower, and the fresh flowers show the number of ray petals as given. How the ray flower is situated in the axils of the inner scales is shown at 6. The three-seried involucre is seen at 7 with the

exterior row the shortest, and all abruptly narrowed at 8. The "receptacle flat" (8) shows a slight variation—"flattish" might answer, but scarcely flat. At 9 we have the persistent chaff, foliaceous, and with hairy tip, partly enclosing the sterile flower (10); those adherent to the involucral scale we see at 11. The oblong ligule of the ray floret we have at 12, and the sterile one (10) dilated, that is swelling, upward and fine-toothed. At 13 we have the undivided hispid style. The akene or seed we need not number, but its equal length to the scale on the back, its form, with the one ridge in front, as it is crowned with the fringed scales, are accurately given.

By tracing thus how well botanist and artist have done their several parts, we are able at the same time to aid the student, by the references, to a familiarity with the various parts of the flower. The difference between the ray floret (10) and the fertile floret (12) is very striking. The perfect pistil (14) we see is deeply divided into two branches, while in the disc floret the pistil (13) develops no further than to a mere thread incapable of performing any function. The mass of stamens, however, which we see at 15, perfect pollen, and it is from these that the stigmas (14) receive it. Most of the composite plants we have so far had occasion to figure have had fertile disc florets, and the chance to study a case where the facts are reversed will be very interesting to the student.

Torrey and Gray, from the work we have quoted, say: "This genus intermediate between *Silphium* and *Parthenium*, is dedicated to our esteemed correspondent, Dr. George Engelmann, of St. Louis, Missouri, who has for several years assiduously studied the plants of Missouri, Arkansas, etc., and made valuable contributions to many European collections, as well as to this work." This was in 1840. Since then Dr. Engelmann has added immensely to his botanical fame, by continuous and valuable botanical work. Although a physician in extensive practice, he takes up, between the times spent in professional duties, special and difficult genera, and thoroughly masters them. Thus

he is esteemed by the botanical world as its leading authority on American Oaks, Coniferous trees, Agaves, Yucca, Cuscuta, Juncus or the Rushes, Cactaceæ and many others. He is not a native of this country, but was born at Frankfort-on-the-Main, on the 2d of February, 1809, so that he is now in his seventieth year, and is still actively engaged in his favorite study. He published his first botanical work in Germany; came to the United States in 1832, when but twenty years of age; and, two years later, settled in St. Louis, where he has ever since remained. No American botanist is more esteemed for his many virtues as well as for his work than Dr. Engelmann, and we are glad that he will be ever remembered in connection with this pretty flower.

Nuttall, who collected this plant, thought it was a species of *Silphium*. No other species but the one we figure has been found, though a marked variety is noted in the account of Lindheimer's Texan plants. Dr. Torrey in the *Annals of the New York Lyceum*, published in 1820, notices the species as having been collected by Dr. James on the Canadian river. Nuttall and Dr. Leavenworth are credited with collecting it on the Red river, in Arkansas; Drummond found it in Texas; and Marcy's expedition in the Witchita mountains.

For the opportunity of making our drawing we are indebted to the Bussey Institution, where it was growing under the care of Mr. Jackson Dawson, of the Arnold arboretum.

EXPLANATIONS OF THE PLATE.—See text.

DIPLOPAPPUS LINARIIFOLIUS.

L. PRANG & COMPANY, BOSTON.

DIPLOPAPPUS LINARIIFOLIUS.

SANDPAPER STAR-WORT.

NATURAL ORDER, COMPOSITÆ.

DIPLOPAPPUS LINARIIFOLIUS, Hooker.—Stem straight, roughish; branches one-flowered, fastigiate; scales imbricate, carinate, as long as the disk; leaves linear, entire, one-veined, mucronate, carinate, rough, rigid, those of the branches recurved. Stems sub-simple, purplish, about one foot high. Leaves numerous, obtuse, with a small mucronate point, shining above. Branchlets near the top, leafy, each with one rather large and showy, violet-colored head. (Wood's *Class-Book of Botany*. See also Gray's *Manual of Botany of the Northern United States*, and Chapman's *Flora of the Southern United States*.)

A LARGE number of the composite or asteraceous plants of our country have a somewhat coarse foliage or habit of growth, with which the present elegant species is in striking contrast. In some parts of the world, the Cape of Good Hope especially, there are many with such a slender and pleasing habit as this; and indeed a first glance at our species by one familiar with the vegetation of those distant parts of the world would create the impression, in the absence of positive knowledge, that it was an exotic plant. Indeed, there are species of this same genus, *Diplopappus*, native to the Cape of Good Hope as well as to the United States. These relationships with the Flora of such distant parts of the world are always of great interest to the student of botanical geography. The species, however, are not very numerous there or here. Even allowing for some which may perhaps rightfully belong to other genera, there may not be many over a couple of dozen of species in all. It was originally classed with *Aster;* and in fact there is very little beyond the general habit and appearance to distinguish it. The "Treasury of Botany" tells us the genus is "very near *Aster*, and only differing in the nature of the pappus, which is double, the

outer row of short, stiff bristles, the inner of capillary bristles as long as the disk florets; while in *Aster* the pappus is single." The fact is, this is one of those cases where general appearance suggests differences which science can scarcely find. Very few would take our present species for an *Aster* when first found. Its general resemblance is with the genus known as *Diplopappus*, but in this species the student will scarcely find the double pappus, the outer row being nearly wanting. In preparing our Fig. 2, it was a point to show this, but it is so very small that without a larger diagram it cannot be seen. Our botanical text-books scarcely give a correct idea of the small size. Dr. Chapman merely says of all the genus, "pappus of capillary bristles in two rows, the outer row much shorter," with nothing as to the length in this species. Dr. Gray in the "Manual" says the "outer series is of very short, stiff bristles," and "very short bristles" in the "School Botany." Professor Wood alone comes down to figures, and he tells us that the exterior pappus is "half a line long," which is one twenty-fourth of an inch. It is a slender character to build a genus on, and which perhaps would not have been thought of in this connection only for the very different habit and appearance of the group from *Aster* in general, as already noted. Dr. Gray, indeed, classes it as *Aster linariifolius* in "School Botany," though he notes that this is "of the old botanists, but is strictly *Diplopappus linariifolius*."

The name *Diplopappus* is from two Greek words—*diploos*, double, and *pappus*, an old man; the latter name in botany has been given to the usually gray hair-like crown which surmounts the seeds in so many compound flowers, and is especially like a gray head in the well-known Dandelion. In our Fig. 2 we see what is known as the "inner row" of the pappus, almost enclosing the floret, as the little flower is called.

As already noted by Dr. Gray, the plant was known as *Aster* by the older botanists, and under this name it appears in Ray's Catalogue about the end of the seventeenth century as the "narrow rosemary-leaved aster of Maryland," that celebrated author

having perhaps been made acquainted with it by his correspondent, the Rev. John Bannister. Linnæus knew it as *Aster linariifolius*, Michaux as *Aster rigidus*, and Nuttall included it in his genus *Chrysopsis* as *C. linariifolia*. The genus *Diplopappus* was founded by Cassini in a paper published in a Paris magazine in the early part of the present century. The genus *Aster* is so very large that though the distinction between it and *Diplopappus* is small, the division, if at all well founded, must be acceptable to students. It will be noted by those fond of accuracy that the common construction of the specific name, linariifolius—that is, "leaves like or belonging to the linaria"—is not according to Latin rules. Linaria should form its genitive linariæ=linariæfolius, and we have to acknowledge our ignorance of any valid reason for the orthography in general use.

The species affords a very pretty botanical lesson in the development of its axial buds to branches, and these again to flowers. As we see in our plate, no buds grow from the axils of the lower leaves, but gradually a few axillary leaves appear as the stem elongates, until the latter is suddenly suppressed, when the axial growths become stronger, and while some of them never become more than little branches, others go on to complete flowers. The sudden arrest of growth in the main stem accelerates that of the branchlets, and we can see that it was this sudden stoppage of growth at the apex which gave the graded impulse downwards, and which resulted in the growth of the axial buds. Precisely the same effect is produced in any growing shoot by artificially arresting its growth—that is, by pinching out its terminal bud. We know that these sudden arrests or sudden accelerations of growth are the foundation of many wonderful changes in the forms of flowers and the general characters of plants; but attention having but recently been drawn to these simple facts, the laws which induce these rythmic growths are not yet understood.

Besides furnishing a valuable lesson in botany, it is a beautiful plant; and those who grow it in gardens generally esteem it highly on this account. It is one of the last of floral charms to

leave us, the seeds being scarcely mature in Pennsylvania by the time the severe frosts come. The height of its season in that State is October, though it commences to flower in September. Prof. Wood places it a month earlier than this. It is generally found in dry, hilly, rather open woods, from Canada to Florida, along the Atlantic coast; but it lessens its northern range as it proceeds west, and is not found on the other side of the Missouri or Mississippi.

It is more favored than many of its allies in being of some use to man in other ways beside its beauty, for in South Carolina, where it is rather abundant, the leaves are used as a substitute for sandpaper in polishing horn.

EXPLANATIONS OF THE PLATE.—1. Branch from several that formed a low bushy plant.
2. Magnified disk floret.

ONOCLEA SENSIBILIS.

L. PRANG & COMPANY, BOSTON.

ONOCLEA SENSIBILIS.

SENSITIVE FERN.

NATURAL ORDER, FILICES.

ONOCLEA SENSIBILIS, Linnæus.—Sterile fronds oblong-triangular; pinnæ lanceolate,—the lower ones distinct, pinnatifid-dentate,—the upper confluent, repand-dentate, or entire. Sterile frond six to fifteen inches long, and five to twelve inches wide at the base; lower pinnæ three to six inches long; stipe six to ten inches long, slender, angular, naked. Fertile fronds four to eight or ten inches long; pinnæ one to three inches long, nearly erect; pinnules triangular-globose, smoothish, dark brown, resembling berries in two-rowed unilateral spikes; stipes eight to twelve inches long, rather stout, terete, naked. (Darlington's *Flora Cestrica*. See also Gray's *Flora of the Northern United States*, Chapman's *Flora of the Southern United States*, Wood's *Class-Book of Botany*, and Williamson's *Ferns of Kentucky*.)

MOST intelligent persons know that according to the modern discoveries in geology, plants existed on the earth ages before man made his appearance thereon; and that in regard to the plants themselves, numerous races have lived and died of which we know nothing now beyond a few traces here and there of a few species which have been preserved to us in the shape of fossil remains. As to the manner of the appearance and disappearance of these races, as the ages followed each other in due course, there are differences of opinion. Some believe that the newer forms have been evolved from the older ones by slow and almost imperceptible degrees. We find, in our time, by closely watching seedling plants, that no two are exact reproductions of their parents, or exactly like each other; and if we are not disposed to think that these variations revolve in a circle, but are continuously in a direct line, it will not be difficult to believe that the accumulation of small differences may in time present a structure very different from what we may imagine the first parent to have been. In this way those who

are known as Evolutionists account for the great variations between living forms and those which existed in the earlier geologic ages. There are other scientific men who regard these differences between the early and recent floras as the result of sudden geologic or cosmic catastrophes, destroying existing forms, and almost contemporaneously succeeding with new ones; and who believe that if any did not happen to come wholly within the range of these great disturbing influences, there would be no reason why a form might not continue without material change for countless ages.

These geological discussions have a peculiar interest in connection with our present subject, the Sensitive Fern, for its remains are found in some very old geological formations in which vegetable remains exist, and precisely in the form in which we find it now. According to Professor Dawson, of Montreal, it was in existence near the Cretacean age, or that time in the earth's history when only reptiles crawled over the surface, and the mammalian or sucking animals had not yet appeared. In Dr. Dawson's own language, in his address to the Natural History section of the American Association for the Advancement of Science, delivered at Detroit in 1875, he says: "In a collection of fossil plants from what may be termed beds of transition from the Cretaceous to the Tertiary, I find among other modern species two recent ferns most curiously associated. One is the common *Onoclea sensibilis*, found now very widely over North America, and which in the so-called miocene times (about the middle of the mammalian era preceding man) lived in Europe also. The other is *Davallia tennifolia*, . . . still abundant on the other side of the Pacific (and Dr. Dawson might have added, still growing with the *Onoclea* there). These little ferns are thus probably older than the Rocky Mountains and the Himalayas, and reach back to a time when Mesozoic Dinosaurs were becoming extinct, and the earliest Placental mammals being introduced. Shall we say that these two ferns, and along with them our two species of Hazel and many other

familiar plants, have propagated themselves unchanged for half a million years?" It is impossible to look on this beautiful fern without a species of veneration for its wonderful antiquity.

Some have thought, however, that it shows some disposition to change, and have named one supposed variation—*O. obtusilobata*. But even this has been ascertained in modern times to be only a phase of development in the transformation of the frond to the reproductive condition, for the mass of fruit (Fig. 3) is nothing but the frond (Fig. 2) in a very much changed state. If we take any fern, say the common Polypody, we shall see that the first leaves are barren, that is, have no fruit dots on their under surfaces, while others are completely covered with sori or fruit dots. Still there is a general resemblance between the fertile fronds and the fronds with sori on them. But in the case of our sensitive fern, the portions of the frond on which the fruit dots are placed have rolled backwards and completely enveloped the mass of sori, giving to this fruiting "frond" the appearance of a cluster of "berries," as Dr. Darlington expresses it. Now, the variety *obtusilobata* is simply a frond in an imperfectly developed fertile condition. There are fewer sori on the frond than in the form we generally see, and the lobes do not recurve very much, but retain a good portion of the regular frondose condition. This form is not unfrequently met with, and is very welcome to the young student as giving the key to the structure of the more advanced fruiting frond.

The manner in which this fertile frond succeeds the barren one will be found particularly interesting to the close observer. Fig. 4 is a portion of the rhizoma or underground stem taken in early winter. The first leaves of the season come out in a nearly simultaneous pair, Figs. 5, 5, and seem attached to the side of the rhizoma like a pair of grasshopper legs. After this effort others are produced which never reach a condition beyond long, slender scales, Figs. 7, 7. About the middle of summer another single one is formed which becomes the fertile "frond," Fig. 3, and which proceeded from Fig. 6. Then a few more scales are

produced, and finally, at the end of the season's growth, the young, circinately arranged leaves which are to push out again into barren fronds on the advent of spring.

Modern botanists have been puzzled to account for its name *sensibilis*, or sensitive fern. Linnæus simply found it in use when he established the binomial system, and retained what he found. Thomas Moore, an authority on ferns, says it "has no other claim to this name beyond the fact of its rapidly withering when cut." Mr. Robinson in his "Ferns of Essex Co., Mass.," has a similar idea, only that the cutting is by frost. He has noted, as the writer of this has, that the slightest white frost injures the fronds; but, after all, frost has this effect on many other of our hardy ferns, and one cannot but wonder why this one more than others should have been singled out as especially "sensitive" on that account. Rafinesque, in his "Medical Flora," published in 1828, at page 67, says that the fronds of *Onoclea sensibilis* are "sensible to a harsh grasp," which "coils them when plucked;" but this seems to be rather a translation of what Linnæus wrote of it than to be an observation of his own. How far coiling may have suggested its generic name, *Onoclea*, is not clear. The text-books tell us it is "from *onos*, a vessel, and *kleio*, to enclose," but no one can exactly see the application. One tells us it is "an ancient name of Dioscorides," but the old Greek writer's plant seems to have had something in connection with the ass, and to have been perhaps an *Anchusa* or some *Boraginaceous* plant. At any rate, whatever may have been the original meaning or derivation of the name, we can only know that our plant had no relation whatever to anything the Greeks or Romans had in their mind.

EXPLANATIONS OF THE PLATE.—1. Rhizome. 2. Barren frond. 3. Fertile frond. 4. Fibrous roots from the rhizome. 5. Bases of the barren fronds. 6. Base of the fertile frond. 7. Abortive fronds or scales.

SARRACENIA PSITTACINA.

L. PRANG & COMPANY, BOSTON.

SARRACENIA PSITTACINA.

PARROT-HEADED PITCHER-PLANT.

NATURAL ORDER, SARRACENIACEÆ.

SARRACENIA PSITTACINA, Michaux.—Leaves short, spreading; tube slender, broadly winged, marked with white spots, and reticulated with purple veins; lamina globose, inflated, incurved-beaked, almost closing the orifice of the tube; leaves two to four inches long; scapes one foot high. (Chapman's *Flora of the Southern United States.* See also Wood's *Class-Book of Botany.*)

THE careful reader will notice that in Professor Wood's "Class-Book" (Ed. 1861, before us) the name of this plant is given as *S. psiticina;* but this is evidently one of those typographical errors which even the most careful editor will sometimes overlook. Dr. Chapman has it S. Psittacina, beginning the specific name with a capital; and as typographical errors are rare in this work, we might conclude that it is no error of the press, but that Dr. Chapman intended it to read this way. There appears, however, to be no reason why it should be so; and we have changed it in the botanical quotation made from his work. This may seem a small matter to some, but as our work is intended for the novices in botanical studies as well as for those who are more accomplished, we take the occasion to explain why capitals are sometimes used in the specific name. Generic names are always commenced with a capital; specific ones only when derived from proper names. Thus *Sarracenia rubra* claims a capital only for the generic name; *rubra*, or red, being a common and not a proper name, does not require it. There are two capitals in *S. Drummondii*, the last word meaning of or belonging to Mr. Drummond. Sometimes however a name which, under some circumstances, may have been a generic

one, becomes merely that of a species, in which case, though it might have been derived originally from a common name, it follows its "proper" form. Now *psittacus* is Latin for a parrot, and a botanist might make a genus under a name derived from this word. In time it might be moved to *Sarracenia*, when in order to carry along its ancient history it would be called *Sarracenia Psittacina*. But it does not appear that this has ever been the case with our present plant, and therefore under the rules the capital should be avoided.

Indeed our present species was not known to the earlier botanists; *S. flava* and *S. purpurea* being the only two that seem to be referred to in Clayton's collection. Michaux, who gave it the name of *psittacina*, was nearly the first to notice it as being particularly distinct from others, though it was supposed to be a form of *S. rubra*, when taken to England by Frazer in 1786. The earlier botanists seem to have had much difficulty in distinguishing it from *S. rubra;* and Croom made a new species of one form under the name of *S. pulchella*, which is now however referred to *S. psittacina*. Croom himself was the first to identify it. In "Silliman's Journal" for 1834, he says: "Ever since I met with the species of *Sarracenia* of which I gave some account in this journal for October last, under the name of *S. pulchella*, I have felt a suspicion that it is the true original of Michaux' *S. psittacina*, which later botanists have united with *S. rubra* of Walter, but from which this species is very distinct, and forming an apparently intermediate species between *S. variolaris* and *S. rubra*. . . . As I have before remarked, the appendix of this species resembles the head of a parrot, and it is the only species in which the resemblance is striking. The leaves too are shorter than those of either of those of the other species, and therefore particularly deserving the application of the word 'brevibus;' while those of *S. rubra*, so far as my observation has extended, are as long as, and even longer than *S. variolaris*. The white spots in the leaves, which I have mentioned, may be what Michaux meant by the term 'coloratis,' while their purple

veins (which I omitted to mention) are well expressed by venoso-reticulatis. In my former account the description which I gave of the longitudinal wing is faulty. Instead of lanceolate, the term semi-lanceolate would have better conveyed the idea I intended—broad above, narrowing to a point below." We give this little piece of history from Croom, in order that moderns may see what difficulties the early botanists had in searching for the facts, and how thankful we may be that their labors have made matters so clear and plain for us.

That the plant is variable we can well imagine after reading what Croom and Chapman say, and comparing it with our plate, which is a faithful copy of one growing in the Cambridge Botanical Garden, which has not the white spots nor purple veins. The leaves in our plate are however very young, as this species flowers among the earliest, and while the new growth is being made. Mr. A. P. Garber says, in the "Botanical Gazette," that he has seen it nearly in flower at Pilatka, in Florida, on the 16th of February.

The broad wing of the leaf in the Parrot pitcher-plant, as referred to by the botanical authorities, is one of the most striking features of this species. As will be seen by our plate the leaf is nearly all wing, and there is scarcely a tubular portion enough left to warrant us in calling it a pitcher at all. As our readers know, the pitchers in *Sarracenia* have been supposed to be special contrivances to catch insects to aid in nourishing the plant. Mr. Nuttall scouted this idea. He says: "The tubes are commonly crowded with dead flies and other insects, perishing in imprisonment by one of the wonderful but simple accidents of nature,—a lesson for the incautious,—but no proof of instinct or necessity in the passive *Sarracenia*, which could probably well maintain its vegetation without the aid of dead insects—a remark equally applicable to many other plants which accidentally prove fatal to insects, such as the wonderful *Dionæa*, which in its native swamps as frequently catches straws as flies, and will equally enfold anything, so subject is it in this

respect to the blindness of accident." It is not our purpose to enter into any controversial questions in this work, but to give enough of facts on all sides to enable the student to form judgments for himself. Without therefore saying that the Pitcher-plants are designed expressly to catch and use insects as food, we may remark that Mr. Nuttall's argument does not prove that they are not, for nature evidently loves to do any one thing in a great variety of ways. It may even be questioned whether the pitcher-leaved *Sarracenias* could maintain their vegetation quite as well without the water and insects. It is interesting to note how little leaf surface there is to act as in other plants. Scarcely anything is left but the pitcher's lid capable of absorbing matter from the atmosphere. Nature indeed seems to look on the pitcher as a substitute for leaf surface. In our present species, which has no insect-catching pitchers worth speaking of, she seems to have thought it necessary to compensate for this absence in the broad green wing, which is indeed the leaf of an ordinary plant in all that relates to general functional power. Having no pitcher, it had to have leaves. Arguments of this kind are not however what the best botanists accept. Instead of looking exclusively to what a plant may do by evident ability from adaptation, what it actually does do is the safer field for investigation.

The Parrot pitcher-plant is confined to a small strip of our great country, between Louisiana and Florida to Georgia.

EXPLANATIONS OF THE PLATE.—1. Flowering plant with the newly pushing leaves. 2. The broad wing. 3. Old leaf (of previous year), showing close resemblance to a parrot head. 4. Cut-off portion, showing the very narrow tube. 5. Showing the "five-cleft, umbrella style" of Dr. Chapman.

LILIUM CANADENSE.

J. PRANG & COMPANY, BOSTON.

LILIUM CANADENSE.

AMERICAN YELLOW LILY.

NATURAL ORDER, LILIACEÆA.

LILIUM CANADENSE, Linnæus.—Leaves three-veined, mostly verticillate, lanceolate, the veins hairy beneath; peduncles terminal, elongated, usually by threes; flowers nodding, the segments spreading, never revolute. Bulb scaly. Stem round, two to four feet high, surrounded by several remote whorls, each consisting of four to six leaves, and often a few scattered ones at the base. These are two to three inches long by the half to one inch wide. Flowers one to three, sometimes seven to twenty, pendulous, yellow, or orange-colored, spotted with dark purple inside. (Wood's *Class-Book of Botany*. See also Gray's *Botany of the Northern United States*, and Chapman's *Flora of the Southern United States*.)

ONGFELLOW, in his beautiful poem of "Flowers," sings of

> "Gorgeous flowerets in the sunlight shining,
> Blossoms flaunting in the eye of day."

He may have had a sunflower in his mind, or it may have been many another flower; but there are few things "in the sunlight shining," and flaunting their "blossoms in the eye of day" more gorgeously than the various species of our native lilies. Indeed the Lily is ever beautiful, is famed for its loveliness in all parts of the world, and has been celebrated in song and story in all ages. Its very name is contemporaneous with history, having been used by Homer; and its literal meaning is "the most charming of all flowers." The ancients imagined that the red Lily was the first to be created, and modern authors believe that the martagon Lily is the species they referred to. The Latin writers speak of it as "Lilium intortum;" and as the martagon turns its petals very much back upon itself, it seems to agree so far with their description. As is the case with most of the

flowers which they highly esteemed, they gave to the red Lily a miraculous origin. It is said that a very excellent young goddess, Sylvia, who was as fair as she was good, had but a poor opinion of Jupiter, who paid his addresses to her. Jupiter was not accustomed to such rebuffs, and treated the fair lady rather roughly; but she was so shocked at such rudeness, that her nose suddenly took to bleeding, and from a few drops which fell to the ground the red Lily sprung. The white Lily is said to be a later creation, and to have sprung from the milk of Juno, and, we are sorry to say, when she was in a somewhat intoxicated condition from imbibing too freely of nectar. Considering the more respectable origin of the red Lily, it seems scarcely just that most of the best Lily-poetry has been given to the white; and that the white Lily, not satisfied with what may be fairly her due, has taken some that belongs of right to her darker sister: for the Lily which Solomon in all his glory could not compete with was much more probably of the red than the white kind. If we are asked to

"Bring Lilies for a maiden's grave,"

or if, on Percival's invitation, we go to

——"a sweet green spot
Where a Lily is blooming fair,"

or, with Keats, to look at one

——"who grew
Like a pale flower by some sad maiden cherished,"

or to see the

"Lady lily gently looking down,"

or in fact to imagine any poetic Lily whatever, the chance is that we shall be called on to go where the

"Queen of the field, in a milk-white mantle drest,
The lovely Lily waved her curling crest."

It is, however, some satisfaction to feel after all this poetic slight of the old world on fair Sylvia's devotion to womanly

decorum, that the new world may fully atone for the injustice, for of the numerous species indigenous to America, there is not one white among them all.

Our present species, *Lilium Canadense*, or American yellow Lily, we believe to be the earliest of all our native species to flower; for though it is not so stated in our text-books, it is not unusual to find it in bloom in the vicinity of Philadelphia the last of May or very early in June. This season (1878) particularly it was noted that not a single flower could be obtained on the 20th of June, all being over blown by that time. The flowers vary very much in color from deep yellow to a rich crimson in different plants. Much remains yet to be learned of Lilies, and especially of this species. There is a form of it from Mississippi which commences to flower just as the form from New Jersey goes out of bloom, and which produces no seeds. The flowers also are of a richer color, and more revolute than Wood's description would imply. Further it will amply repay the student to watch the behavior of the flowers when about to seed. When the flower first opens it hangs on its sub-erect stem, the pistil curving but little upwards. It makes no growth whatever for several days, or until the petals begin to fade,—then the pistil takes an upward curve, sometimes so much as to have its apex pointing towards the ovary. For several days after this the ovary or pistil remains stationary, when at length the former assumes a straight line with the pedicel, and finally erect, in which position the seed vessel matures. We thus see that growth in nature is not by regular advances; but is by leaps, or as we say, rhythmical.

There is a great general resemblance between the species of lilies, and it is not easy to distinguish one from another. The yellow Lily approaches the *L. superbum*, but is generally out of flower before that commences to open; the divisions of the perianth or flower cup as a general rule do not turn back quite so much,—but a good distinction lies in the terminal character of the flowers in the best specimens of our species; that is, the flowers seem to come out in a bunch or cluster at the top of the

stalk as shown in our plate (Fig. 1), while in the best specimens of *L. superbum* the flowers are more or less axillary as well as terminal, though in poor specimens of the latter when there are but two or three flowers on the stalk, they are only terminal, as in *L. Canadense.*

The Lily increases by underground stems. These, very much arrested in their development, form the bulb, as may be seen by the great number of small scales, each of which is the representative of a leaf. As three of these leaves would make a circle round the stem if alternately scattered as they are on many allied plants, we may have some idea from the number of these little scales how long the lily stem would be if accelerated instead of arrested as the stems or branches of ordinary plants are. As we see in our Figs. 2 and 3, the rhizoma or underground stem pushes out from the base of the last year's bulb (Fig. 2), gradually thickening as it approaches the end of its season of growth. The new bulb (Fig. 3) in the case illustrated is much larger than its predecessor, and will make a stronger flower stem next year.

The yellow Lily is found in all portions of the United States east of the Mississippi, and in Arkansas and Minnesota, skipping Kansas. Some closely allied forms are also found on the Pacific slope, but botanists are not yet agreed as to whether they are really distinct species or forms of this one. It is usually found in wet, open meadows, but as we go southwardly it is found only at the higher elevations, showing that its real home centre is towards the north.

EXPLANATIONS OF THE PLATE.—1. Top of an averaged-sized flower stem, from Massachusetts. 2. The flowering bulb. 3. New bulb for flowering the next year.

2

1.

SOLANUM TORREYI.

J. PRANG & COMPANY, BOSTON.

SOLANUM TORREYI.

TORREY'S SOLANUM.

NATURAL ORDER, SOLANACEÆ.

SOLANUM TORREYI, Gray.—Cinereous with a somewhat close furfuraceous pubescence composed of about equally nine to twelve-rayed hairs: prickles small and subulate, scanty along the stem and midribs, or sometimes nearly wanting: leaves ovate with truncate or slightly cordate base, sinuately five to seven-lobed (four to six inches long); the lobes entire or undulate, obtuse, unarmed: cymes at first terminal, loose, bifid or trifid; lobes of the calyx (often six) short ovate with a long abrupt acumination. Corolla an inch and a half in diameter; its lobes broadly ovate: berry globose, an inch in diameter, yellow when mature. (Dr. Asa Gray in *Synoptical Flora of North America.*)

THIS beautiful species of *Solanum* has a very brief botanical history. It appears to have been met with by Lindheimer in Texas in 1843, "around Houston, the Brazos, etc." and is noted in an account of his collections by Engelmann and Gray in 1845. It was then not well understood, and referred doubtfully to an old Linnæan species, a native of the West Indies, named *Solanum mammosum*, and some comparison made between it and the *Solanum Caroliniense*, the well-known "Horse-Nettle," so troublesome to cultivators in many parts of the Union. Dr. Gray also notes in the "Synopsis" that one described as *S. platyphyllum* by Dr. Torrey is to be regarded as this species; the *S. platyphyllum* described by Humboldt, Bonpland and Kunth from South America being something else. Torrey's name being therefore appropriated by another, according to botanical rules the plant has to be renamed, and thus we find it now, as given by Dr. Gray, *S. Torreyi.* This is all that we find noted of it in botanical works. Its geographical history is as brief. Dr. Gray says it grows on "Prairies, etc.—in Kansas and Texas." It is not however in the catalogue of Kansas plants recently issued

by Professor Snow, and is probably rare in that State. Indeed from the fact that while so many collectors have been over both the States named in different directions it does not appear in their lists, it is probable that it is not a common species. If this be so it is remarkable, as the plant increases from creeping under-ground stems; or at least every portion of its roots, when broken, will push out and make a plant, in this respect much resembling the "Horse-Nettle" before referred to, and which is so great a pest that in Delaware the writer has known cultivated ground abandoned on account of its existence. It is well to take particular notice of this power of growth possessed by the roots, as from its beauty it will probably be sought for by cultivators, and may become very troublesome unless this character be well known. To those who understand it little trouble need arise from its culture, for its neighbor, the "Horse-Nettle," is easily kept within bounds by a little watchfulness. A case came under the writer's notice where the "Horse-Nettle" had established itself profusely before it was observed, but on its discovery a boy was set to dig the roots out carefully. Broken portions left in the earth grew, and these were again taken out. This was repeated three times during the season, and it was believed that all were destroyed; but on closely watching, a few plants were found the next year, and were also taken out, and no more appeared any time afterwards. This was on a large scale, and of course entailed great labor, but a very little care would be sufficient to keep a single plant within bounds under garden culture. Its beauty well deserves any little attention that may be required in cultivating it.

Torrey's *Solanum*, while it has not much history of its own to boast of, belongs to a very celebrated genus. In numbers they are enormous. Don, in his "Dictionary of Gardening," published in 1838, numbers 406 of them, without including the Tomato-like species and others which were regarded as *Solanums* by Linnæus. Decandolle in his "Prodromus" gives nine hundred and twenty species! So that a critical study of this genus is

almost enough for one man. It is also interesting to note that the greater part of these are natives of the American Continent. They mostly love heat, however, and few species are found able to endure the winter of the United States. Dr. Gray has less than twenty species in his "Synopsis," and some of these are doubtfully native.

The name *Solanum* is a very ancient one, and no one now seems to know to what plant it was originally applied, or why the name was given to whatever plant it may have been. Don says it is "a name given by Pliny, but the derivation is uncertain. Some derive it from *Sol*, the sun; others say it is Solanum, from *Sus*, being serviceable in disorders of swine; and others from *Solor*, to comfort, from its soothing narcotic effects: all these conjectures are, however, improbable." Some botanists have adopted one, some another of these conjectures, but Dr. Gray decides the "derivation uncertain." It may be noted however that the first and last suggestions given by Don are probably the same, as *Solor* and *Sol* are evidently from the same root. The Latin poet Virgil evidently uses the word *Sol* in the application to clear soothing weather, and the transition in this relation to our word solace is evident enough. Ainsworth in his dictionary says positively Solanum is *a sole*, which is Latin signifying from the Sun. All that is certainly known is that by the name the old Greeks and Romans had in view some soothing or narcotic plant, and what were known as "Nightshades," during the Middle Ages, or at least as far back as we can trace botanical knowledge, were associated with *Solanum*. Tournefort, about the year 1700, limited the genus as we now have it, and Linnæus adopted the name in his "Genera Plantarum," in 1737.

Associated as *Solanum* was with the "Nightshades" in which is the celebrated *Atropa Belladonna*, the whole family of Solanum was at one time looked on with suspicion. The potato and, for the popular purpose we have now in view, the egg-plant and tomato, all near enough to the genus to be at one time consid-

ered by good botanists members of it, were supposed to be in some measure poisonous. The tubers of the potato were thought to be safe only after they were cooked; and even within the memory of the present writer few persons thought it quite safe to eat a raw tomato. The immense quantities of tomatoes eaten uncooked in our time would have astonished our forefathers. It is not however clear how far they are poisonous. Griffith, in his "Medical Botany," says the leaves of the tomato will produce vomiting; and other medical writers tell us that the "balls," or seed-vessels of the potato, eaten have caused certain death. But who would make the trial, for these potato fruits are very nauseous, and have nothing to attract even a child? The *Solanum mammosum*, with which our species was once associated, and to which it is closely allied, is said by Ainslee to bear "a large and poisonous fruit." We give all this as part of the associated history, but have an impression that our pretty flowering species, *S. Torreyi*, will not be found such a very bad fellow after all.

Of late years much attention has been given to the study of the hairs of plants. They often exhibit a great variety in form and structure, and as in *S. Torreyi* the hairs are particularly referred to by Dr. Gray in the description quoted from his work, we have given an enlarged drawing of one which in this case is branched, or in botanical language, stellate. There seemed to be none "eight to twelve rayed" on our plant, as Dr. Gray finds in his specimens. All were uniformly seven rayed, as in our very much magnified engraving (Fig. 2), which is given as a back view showing a small pedicel to which the rays are attached.

For the opportunity of illustrating this rare and pretty species we are indebted to the Cambridge Botanical Garden, where it was growing to perfection under the care of Mr. W. Falconer, gardener there.

EXPLANATIONS OF THE PLATE.—1. A flowering branch. 2. Stellate hair enlarged from the under-side of a leaf.

POLYPODIUM CALIFORNICUM.

POLYPODIUM CALIFORNICUM.

CALIFORNIAN POLYPODY.

NATURAL ORDER, FILICES.

POLYPODIUM CALIFORNICUM, Kaulfuss.—Fronds deeply pinnatifid; segments oblong, retuse, sharply serrate, the inferior ones narrower towards the base, decurrent; veins oblique parallel; veinlets dichotomous, anastomosing; sori ovate, solitary. (Kaulfuss *in Enumeratio Filicum quas in itinere circa terram legit cl. Adelbertus de Chamisso*, etc.)

AS none of our popular botanical text-books contain any description of this pretty fern, we have translated the original description of the species as given by Dr. Frederick Kaulfuss in the work above referred to. Chamisso accompanied the navigator Kotzebue in his celebrated voyage; and Kaulfuss, who was professor of botany in the celebrated German University of Halle, described and remarked on the ferns his friend collected. According to Kaulfuss, Chamisso simply gives "California" as its location, but it is found much farther north, as specimens from which our drawing was made were gathered for us near the Falls of the Wilhamette by Mrs. Fanny E. Briggs, who thus graphically describes the spot from whence they came: "Oregon City, one of the oldest towns in the State, is the most picturesque in situation I have yet met with. Here are the Falls of the Wilhamette, and a line of high rocky bluffs rise abruptly, leaving only a narrow strip of level ground along the river. The railroad is built on this. The town is wholly on the bluffs, and is reached by long flights of stairs, some of the steps set zigzag in upright frames. The town is neat and pretty, with gardens, shade and fruit trees in abundance. The rocky face of the bluff is covered by mosses, ferns and vines, and two or three little silver ribbon-like mountain streams leap sparklingly

from its rocky brow." We are very glad to be able to give a representation of this very beautiful fern, because in pursuance of our plan to take representatives of the Flora from every part of the United States we want to have Oregon represented; and also because this species offers the opportunity to say a little on the importance of examining the veins in determining the various kinds of ferns. The earlier botanists paid attention chiefly to the form of the fruit dots, their position on the fronds, or their situation on the veins; but characters derived from the veins themselves do not appear to have attracted much attention till a comparatively modern date. In 1836 Professor C. B. Presl, one of two brothers both celebrated botanists of Prague, published a work on ferns in which characters drawn from the veins occupied a very prominent position. Those who make ferns a special study do not seem to agree in all cases with Professor Presl as to the precise value of such characters, but still they are found generally to be of as much value as most other characters in ferns, and hence all students in these times examine the veins as closely as any other parts of a fern. Some veins are simple, others branched, others run completely to the margin, while others stop short. Again there are others which continually diverge, and no matter what may be their length never touch another after having once started from the parent vein; while there are others which seem to run backwards and forwards, connecting one with another, and forming a complete net-work all over the surface. In some cases these characters are constant, that is to say, are generally found the same in all the specimens of the species we may find, and then they form what botanists call a valuable character; but in other cases they are found to vary, sometimes having perhaps free veins, that is never being connected at their points, and at others they form a net-work, or as it is technically said, they anastomose.

Our present species is just one of these uncertain cases. It will be noted that the description translated from Kaulfuss says "veinlets anastomosing," but these will not be found in that

condition on our plate. The reason is that about the time when our species was first discovered the condition of the veins was supposed to be more unchangeable than it is known to be now. In some places a form was found like it that did not have the netted veins, and it was thought therefore to be another species, and named by Hooker and Arnott *Polypodium intermedium;* but as more specimens were discovered some of the former would occasionally be found with free veins and some of the latter with netted veins, and therefore in this case at least the character is worth nothing as a distinction. Consequently Hooker, in his "Species Filicum" published in 1864, united the two, and they are now both known by the oldest name *P. Californicum.* Our plant in its earlier history would have been probably known as *P. intermedium.*

Whether a form is to be considered as a distinct species or as a mere variety depends very much on experience as to the fixity of characters, rather than on any specific points that can be readily explained; and we can see in this case that only for the fact that a few netted veins had been found in one case, and a few free veins in another case, both forms would in all probability be regarded as distinct species to this day; and it is such facts as these which make observations on the range of variation in species of so much value to practical botanists. In ferns especially very much has to be learned on this point. For want of this knowledge synonyms are very numerous. In the case of our present species, Professor Kunze, in a paper translated in "Silliman's Journal," new series, Vol. 6th, remarks that Hooker and Greville, standard authors on ferns, had united very different species with it. Another writer in the 6th Volume of the "Bulletin of the Torrey Botanical Club" suggests a doubt whether another species of the Pacific Coast, *Polypodium falcatum,* may not be referred to *P. Californicum.* Botanists may not be wholly prepared for this view yet, although we incline to it; but it shows how uncertain much fern knowledge yet remains.

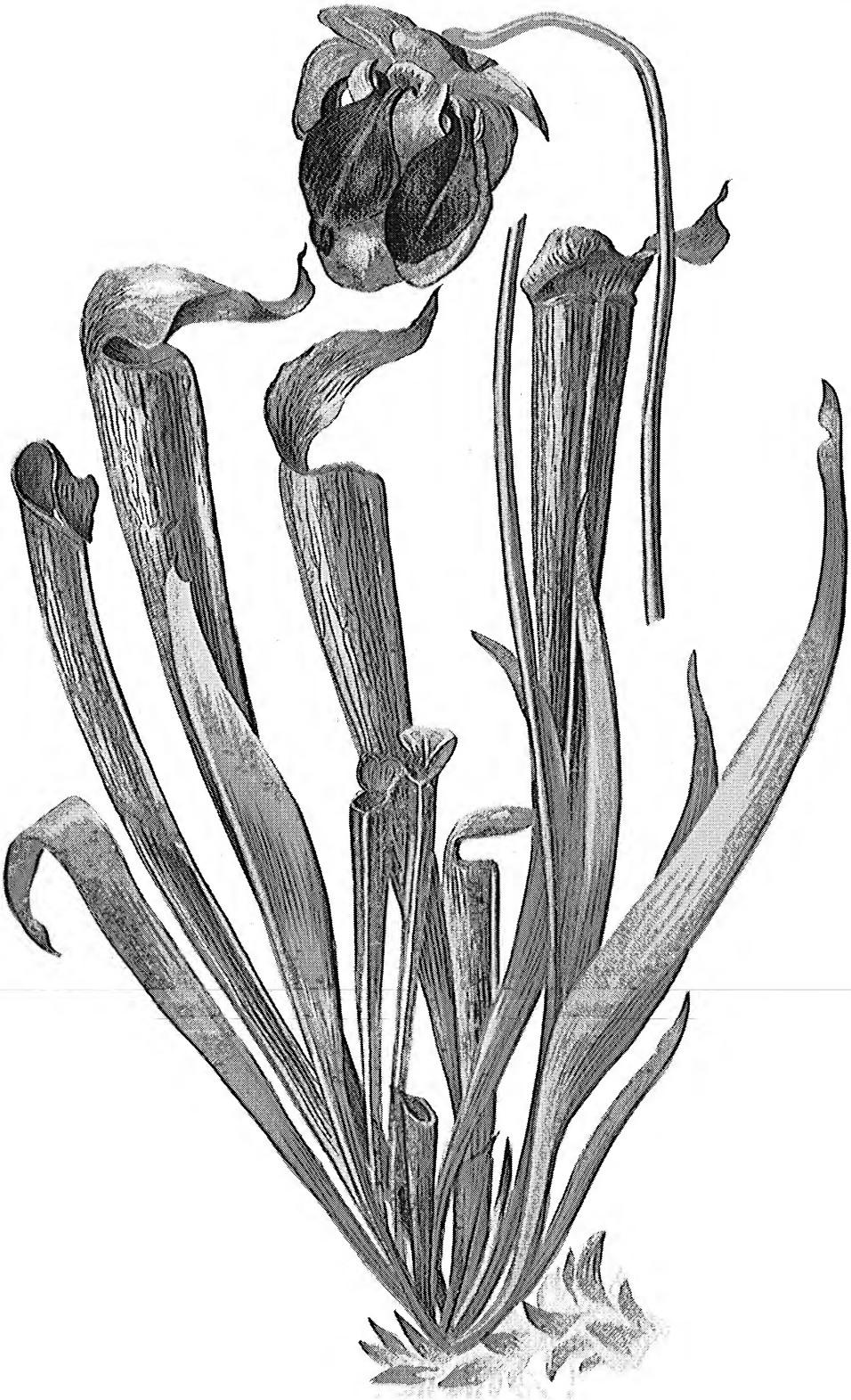
A very pretty feature in our Californian Polypody is its trans-

parent veins as seen when held up to the light. These veins are club-shaped, or thickened upwards at the termination, a point that does not seem to have attracted the attention of describers, though as to the mere frond differences in the opacity of the various forms have been commented on.

Kaulfuss in the work from which we have translated the description says it is "similar to *Polypodium vulgare*," which is our common Eastern form. But this is from the botanist's standpoint. The popular vote will be that it is much handsomer, by its more slender lobes and generally graceful fronds.

If we, as it seems we must, combine *P. intermedium* with *P. Californicum*, it gives a wide geographical range to it on the Pacific Coast from the Columbia River southwards.

EXPLANATION OF THE PLATE.—1. An average sized plant. 2. An enlarged portion of a division of the frond showing the veinlets and the soi thereon.



SARRACENIA RUBRA.

L. PRANG & COMPANY, BOSTON.

SARRACENIA RUBRA.

RED-FLOWERED TRUMPET LEAF.—WALTER'S SARRACENIA.

NATURAL ORDER, SARRACENIACEÆ.

SARRACENIA RUBRA, Walter.—Leaves elongated, erect, slender, narrowly winged, paler above, and reticulated with purple veins; lamina ovate, erect, beak-pointed, tomentose within; flowers reddish purple. Leaves ten to eighteen inches long, shorter than the scapes. (Chapman's *Flora of the Southern United States.* See also Wood's *Class-Book of Botany*, under *S. Gronovii.*)

THIS species of the "Side-saddle flower" well illustrates a point often made, that names may be misleading, and that names which have no particular meaning so far as the application to any character in the plant is concerned, are at least as good as any. This particular species was named by Thomas Walter, who published a history of the plants of the Carolinas in 1788. As *Sarracenia rubra*, it is the red-flowered Sarracenia, naturally enough from Walter's name; but there are other Sarracenias as "red" as this, and the collector of wild flowers must therefore remember when he reads of the "Red Sarracenia," that it is merely "its name." Still, as it is just as well to avoid misleading names, we propose to those who may wish a better name than the only one so far known for it, that it be called "Walter's Sarracenia."

The Sarracenias are so unlike most other plants, that the student is particularly interested in how they are made, and the especial reasons for their peculiar structure. While, as Percival says, generally

> "In flowers
> The serpent hides his venom, and the sting
> Of the dread insect lurks in fairest bowers,"

the case is reversed here. There is no lurking of dread insects

about these flowers. It is the plant which acts like the "venomous serpent," and entices the "lurking insect" to its sure destruction. How they work to this end is very curious. In "Silliman's Journal" for 1873, Professor Gray quotes from the English translation of Maout and Decaisnes' "System of Botany:" "The pitcher-shaped leaves are effective insect traps; a sugary secretion exudes at the mouth of the pitchers and attracts insects, which descend lower in the tube, where they meet with a belt of reflexed hairs, which facilitate their descent into a watery fluid that fills the bottom of the cavity, and at the same time prevents their egress." This is given as of our present plant, *S. rubra*, but as Canada is mentioned, Dr. Gray thinks it must have had reference to *S. purpurea*, which is the only one found in Canada. Dr. Gray says he wishes "to call attention to the statement that *Sarracenia* produces a sugary excretion which attracts flies to their ruin, this being the first time, so far as I know, that any such statement has appeared in print." However, it appears in print in American publications long before this. In Darby's "Botany of the Southern States," written in 1855, we read at page 219: "This genus affords a striking example of a great modification of the petiole, since there is no doubt the tube part is the petiole, and what we call the lamina, the true lamina of the leaf. These tubes are generally filled with water, which is supposed to be secreted by the plant, and this always contains dead insects. The tube could not have been formed in a better manner to accomplish a given end than this is to catch insects. The saccharine secretion which surrounds the orifice decoys insects to the tube, and the water entices them in. There are hairs pointing downwards so as to permit an easy descent, but makes the egress difficult." As before noted, it is not certain that our present species, the red or Walter's Sarracenia, has this power of excreting honeyed matter; so we give what is said of it in full, that collectors may be on the lookout to verify the statement for themselves.

As for the fact that the pitcher is the petiole, and that it has

been produced in this form for the purpose of insect-catching, it may be well to note that in Willdenow's "Species Plantarum" this singular passage occurs: "Sic metamorphosis folii Nymphææ in folium Sarraceniæ, ut ipsa aquam pluvialem excipiens et retinens extra aquas crescat; mira naturæ providentia;" which may be translated: "Such is the metamorphis of the leaf of the Nymphæa into that of the Sarracenia, in order that, by receiving and retaining rain water, it may, by a wonderful provision of nature, grow where there is no water." The sentence is very remarkable as showing that the early fathers of modern botany had anticipated the celebrated men of our time in conceiving the theory of evolution.

As to the idea that these pitchers are modified petioles, and that the leaf blade is something else, it is highly probable that all petioles are modified leaf blades, and that the distinction between the two is of practical value only as a help in description and classification. It is likely that the primordial plan is that of a lobed leaf, such as we might find in the *Liriodendron*, or "tulip tree," and that the lower lobes became united at their edges, leaving the upper, now forming the lid, free—and that the petioles of many plants may be formed in the same manner. However, as regards the *Sarracenia*, the manner in which the "wing" is developed in *S. psittacina*, leaving the "pitcher" little more than a mid-rib, is very suggestive. But this is much better seen by a singular genus of this same order, Sarraceniaceæ, found in Guayana by Sir R. Schomberg, called *Heliamphora nutans*, in which the primordial leaf was evidently three-lobed, and from the orifice is so slit down on one side that we should as soon think of dividing the spathe of an arum into petiole and leaf-blade as this. We can easily see from the *Heliamphora* that we may more correctly say the pitcher of the *Sarracenia* is a folded leaf than an inflated petiole.

Among the interesting facts brought out within recent years is that of the different species of *Sarracenia* intercrossing freely together. Mr. David Moore, of the Glasnevin Botanic Gardens

in Ireland, has recently exhibited before the Royal Dublin Society, an eminently scientific body, some beautiful hybrids between our present species, *S. rubra*, and *S. flava*. In this case the hybrid resulted in forms intermediate between the two species. At one time it was thought not easy to cultivate these curious plants, but the skill of modern gardeners is not only equal to the task, but as we see, is able to raise them up from the seed to full maturity, even to the production of new forms. In regard to these new varieties, it may, however, be noted that the species are very variable even in wild nature. This variation induced Prof. Wood to group together this and several others usually regarded as good species under the name of *S. Gronovii* in his "Class-Book of Botany."

For the opportunity to draw our plant, we are indebted to Prof. C. S. Sargent, of the Cambridge Botanic Garden, Mass.

IMPATIENS FULVA.

L. PRANG & COMPANY, BOSTON.

IMPATIENS FULVA.

SPOTTED TOUCH-ME-NOT, OR SNAP-WEED.

NATURAL ORDER, BALSAMINACEÆ.

IMPATIENS FULVA, Nuttall.—Leaves rhombic-ovate, obtusish, coarsely and obtusely serrate, teeth mucronate; pedicel two to four-flowered, short; lower gibbous sepal, acutely conical, longer than broad, with an elongated, closely reflexed spur; flowers deep orange, maculate with many brown spots. Stem one and a half to three feet high. Leaves one to three inches long, one half as wide, having a few filiform teeth at the base. Flowers about one inch in length, the recurved spur of the lower sepals half inch long. Capsule oblong-cylindric one inch long, bursting at the slightest touch when mature, and scattering the seed. (Wood's *Class-Book of Botany*. See also Gray's *Manual of the Botany of the Northern United States;* and Chapman's *Botany of the Southern United States.*)

THIS extremely interesting plant is well known to the lovers of wild flowers, for it has so many points of attraction, that there are few who have not more or less observed it. The flowers themselves are so peculiar in their form, and so rich in color, as to have earned for the plant the common name of "Jewel weed;" while the remarkable sensitiveness of the seed vessels to the touch, as referred to in the description quoted from Professor Wood, has obtained for the plant the name of "Touch-me-not," a name which is applied to this and other allied species by all the nations of Europe. The suddenness with which the seed vessel falls to pieces when it is grasped in one's hand, no matter how lightly, is surprising to one who experiences it for the first time. When Burns wrote

> "But pleasures are like poppies spread;
> You seize the flower, its bloom is shed,"

he unconsciously characterized also the behavior of these seed vessels which leave us so little where we expected so much! Dr. Prior says the name, "Touch-me-not," is "a phrase that was

familiar from the 'noli-me-tangere' pictures in Roman Catholic countries." The old European species is called *Impatiens noli-tangere*, and the earlier botanists of our country supposed they found the same species here, but it was finally discovered to be distinct from the European one. The botanical name of the genus, *Impatiens*, meaning impatient, is also derived from the peculiar behavior of the seed vessel when touched. The name *Impatiens* is credited in modern works to Linnæus, who simply adopted it, as he tells us in the "Genera Plantarum," from Rivinus, a writer of about 1690; and we find the same name in use by Dœdens, a botanical author who flourished about the same time. Plukenet, Ray, and others of that period not only refer to *Impatiens*, but are believed to have had our kind in view. The present species was included in the early collections of Clayton in Virginia and of Colden from New York, as we learn from the writings of Gronovius. It may appear singular to some that so old and evidently well-known a plant should bear so modern a name as one dating from only 1818, Nuttall having then named it *I. fulva*. Of this Nuttall says: "This is the *I. biflora* of Willdenow, and of Pursh in his 'Flora,' and also the *I. maculata* of Muhlenberg's 'Catalogue.' As several species are spotted I have not adopted the last name; and I have changed the former because it was deceptive." It may be observed about this that if names were to be changed in these days for such reasons as these, our list of synonyms would be hugely increased. *Polygonatum biflorum* may have but one flower from each axil, and again it is found with four; but no one seeks to change the name "because it is deceptive." It is remarkable, however, that Nuttall's name with no better reason has displaced the prior names in all American botanical works of the present time; even Mr. Sereno Watson, usually so scrupulously impartial in the application of the laws of priority, uses Nuttall's name as the proper one in his recent "Bibliography." Our work being to give a history of Botany as we find it, we, of course, have had to use the name in our quotation from Professor Wood's Class-Book.

The genus has been the victim of uncertainties in some of its relationships, and the species have fared no better. Linnæus, who arranged plants on his sexual system, classed *Impatiens* as a syngenesious plant! In this class were also included what we now call composites. Nuttall, who also arranged his plants on the sexual system, places it in the class Pentandria. Nor has it been more settled under the natural system of more modern botanists. Wood, from whom we quote, gives it to the order *Balsaminaceæ*. But many modern botanists do not regard this as an independent order, and the student from this point of view would have to search for our plant among the *Geraniaceæ*.

A peculiar feature of this and allied species of *Impatiens* is that the later flowers are often cleistogenous; that is to say, while the earlier flowers have petals and are complete in all their parts, as in our plate, the later ones have no petals, or anything that would be popularly called a flower, and yield barely pollen enough to fertilize the ovary and produce seed. Fertilization is effected before the bud opens, and the first knowledge the observer has of the existence of any flowering operation is by the growing seed vessel pushing from the bud. In England, where close observations on this species have been made by Mr. A. W. Bennet, these cleistogenenic flowers have been found in the proportion of twenty to one of the petal bearing, or as they are called, "perfect" ones. In the vicinity of the writer's home the proportion is generally about one-half. In Europe the perfect flowers seem rarely to produce seeds. But here they bear freely, and plants may be seen covered with seed vessels before any cleistogene flowers appear. The subject is one of great interest, and will prove an inviting field for the student fond of original research.

There are many facts worth noting in the life-history of the *Impatiens fulva*. In the "Bulletin of the Torrey Bot. Club" for 1872, it is noted that the inhabitants of Green county, New York, call it "Silver leaf," because when placed under water the leaf glistens like silver, and does not get wet. In the volume for

1877 of the same serial Mr. W. W. Bailey, of Providence, R. I., remarks on a friend of his finding "the sacs all perforated by bumble-bees," and adds: "You may remember that Dr. Gray says this is only likely to happen in a profusely flowering species." Another writer somewhere, but the exact reference not at hand, remarks that it has been reported that the leaves hang down at nightfall, and become horizontal soon after daylight—a statement the writer of this has confirmed by actual observation. Many of these behaviors are by no means confined to the *Impatiens fulva*, but they all afford interesting observations to the curious student.

Besides its value in connection with its scientific lessons, it has a directly practical use to man, for Mr. Nuttall, on the authority of Dr. Barton, says it is sometimes used for dyeing salmon color; and it is said by others to be useful when applied to portions of the skin poisoned by the common poison vine, *Rhus toxicodendron*.

In its geographical range it is confined on the Atlantic slope of our country to that portion east of the Mississippi and Missouri, except to a small tract within Arkansas, growing chiefly in low or damp places. According to Torrey and Gray it is also found on the north-western portion of the Pacific slope.

Dr. Darlington gives as the prevailing common names "Tawny Impatiens" and "Spotted Snap-weed;" the last being more easily understood by people who are not botanists, we have proposed for adoption.

IRIS VERNA.

L. PRANG & COMPANY, BOSTON.

IRIS VERNA.

SPRING IRIS.

NATURAL ORDER, IRIDACEÆ.

IRIS VERNA, Linnæus.—Leaves linear-ensiform, rigid, rather longer than the low, one-flowered scape; tube of the perianth filiform (two inches long), about equalling the length of the segments; sepals and petals nearly equal, oblong-obovate, obtuse, neither crested nor bearded, stigma deeply bifid. Stem or scape three to five inches high, sheathed with colored bracts. Flowers pale blue, the sepals with an oblong, or orange yellow, spotted stripe. (Wood's *Class-Book of Botany*. See also Chapman's *Flora of the Southern United States*.)

AS one proceeds to write a popular chapter on an *Iris*, the many poetical and historical associations connected with it crowd on the mind. Mythological accounts of its origin in connection with Juno's fair messenger are numerous, and as no two accounts exactly agree, a collection of the various versions would form a very pretty chapter in imaginative floral literature.

Louisa Ann Twamley has a pretty story about the naming of the Iris at one of the courts held by Flora,—

"All with their pearls so fair
The gay flowers wreathed were,
But, midst them all,
Crowned at the rainbow festival,
A sapphire-colored blossom shone
The loveliest there; no other one
Her jewels wore
So gracefully. Her robe all o'er
Was radiant, yet deep blue, like twilight sky,
And softly shaded, as when clouds do lie
Upon the deep expanse. 'Twas strange, none knew
A name for this fair form, so bright and blue:
But sister-flowerets fancifully said,
As they to note her beauty had been led
By its enhancement in the rainbow shower,
They e'en would call her IRIS from that hour."

The word iris, as is well known, is Greek for rainbow, but the etymology of the word goes beyond this, acquainting us with the reason why the rainbow is so called; it seems to have been derived from *iro*, to foretell, the rainbow in old times having been supposed to be the heavenly messenger foretelling rain instead of, as now recognized, the actual consequence of the shower.

The *Iris verna* is one of the earliest of spring flowers in the Southern States, being often in bloom in March among the forest leaves and before the green grass has hardly begun to grow. As Park Benjamin says of the Trailing Arbutus,—

> "Thou comest when spring her coronal weaves,
> And thou hidest thyself mid dead strewn leaves;
> Where the young grass lifts its tender blade,
> Thy home and thy resting place is made;
> And in the spot of thy lowly birth,
> Unseen, thou bloomest,——"

Mrs. Sara J. Hale, in her "Flora's Interpreter," explains to the reader that the Trailing Arbutus is "a sort of a strawberry vine, found in New England in March, the earliest of all spring flowers." When such a monstrous suggestion can pass through the current of literature unchallenged, we shall surely be pardoned for using the poet's lines so appropriately here.

Our plate shows the arrangement by which the plant is able to flower so early. Most Irises have to give as much growth to the flowering shoot as to the leaves on the barren shoots. Indeed in many cases the flower scape exceeds the leaves in length. In this species the increase of the plant is by underground runners which form leaf buds at various distances along their length. These buds make leaves at once, and form other buds at the base which do not develop till the following spring. These basal buds which are to flower push up immediately when the warm spring weather comes, and bloom as soon as they reach the surface, forming only a few diminutive leaves along the stems. Our Fig. 1 represents this. At Fig. 2 we have the

terminal growth of the underground runner for the season. This also has buds at the base, but shows no disposition to flower, and from this we may infer that the buds which do flower are considerably developed before winter sets in, and this too may be in favor of its early blossoming. Much may remain to be learned about its habits. The opportunity to study its behavior in a state of nature has not been favorable, as it inhabits woods in the South within a somewhat limited region, and away from thickly settled places. Professor Wood says only "Hilly woods in the interior of the Southern States;" and Dr. Chapman says, "Pine barrens of the middle districts, mostly in dry soil, Alabama to North Carolina." It may perhaps be found more extended than this when the local botany of the Southern States shall be more fully known. The editor of the "Botanical Gazette" notices in the first volume of that serial that he found it on the "knobs of Southern Indiana;" and Dr. Gray admits it into his "Manual of Botany of the Northern United States" as being found in Virginia and Kentucky.

Though confined to such a comparatively limited district, it seems to have early attracted the attention of botanists in our country. Gronovius in his "Flora Virginica," ed. of 1762, notices it as having been known to David Bannister, who collected much earlier in the century. It was also in the collection which Clayton sent to him. It seems to have been known in England as a cultivated plant so early as 1748.

The peculiar running roots, not common at least in *Iris*, were noticed by these early botanists. In those days the binomial system, or that which restricted the names to two, that of genera and species, had not been adopted, and Gronovius refers to this as the Iris which has "a fibrous root, one flowered stalk, shorter than the leaves, and with a beardless corolla." To Linnæus we are indebted for the short specific name *verna* in place of the long string of descriptives as given above.

The Irises of the old world have been very much improved by natural selection and inter-crossing, and of some of the kinds

a large number of varieties have been obtained of much superior beauty to the originals. Floriculture has not yet had the same devoted skill and attention bestowed on it in the New World, and hence many of our beautiful plants are awaiting some energetic florist's care to rival in beauty and variety some of the famous race of florists' flowers of Europe. Our spring Iris offers great inducements for such nice work as this, and if once improved would no doubt not only be popular as a spring flower, but there would be the addition of the fragrance which it possesses, for most of the popular races of improved Irises of the gardens are wanting in this great attraction. There is no doubt it would readily change under the hands of the florists, as there seem to be variations in nature. Gronovius, already quoted, speaks of Clayton having found one with pure white flowers; and Peter Collinson, in a letter to John Bartram, dated March 4th, 1764, refers to his "true correspondent, Mrs. Logan," sending him "what she calls a white Iris from Georgia," but whether certainly of this species we cannot tell.

Gronovius says the vernal Iris was reputed to have medicinal qualities, and Dr. Peyre Porcher seems to confirm this by remarking that "it is said to possess properties similar to those of the L. versicolor." The chief of these properties may be given in the language of Bartram that "the root is considered by the Indians a very powerful cathartic, and it is found in artificial ponds made for the purpose near their villages."

For the plant from which our drawing was made we are indebted to Prof. Sargent, of the Cambridge Botanical Garden.

EXPLANATIONS OF THE PLATE.—1. Leaf growth of last year with flower bud the following spring arising from its base. 2. Terminal growth of the previous year.

WOODSIA OBTUSA.

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WOODSIA OBTUSA.

COMMON WOODSIA.

NATURAL ORDER, FILICES.

WOODSIA OBTUSA, Torrey.—Frond sub-pinnate, or nearly tri-pinnate. Minutely glandular-pilous; leaflets distant; segments of the leaflets pinnatifid; ultimate segments roundish-oblong, obtuse, bi-dentate; sori round, one at each cleft between the leaflets, at length crowded; stipe somewhat chaffy. Fronds lance-oblong in outline, three times as long as wide. Segments of the leaflets crevate-serrate, the lower ones distinct, upper confluent. Sori orbicular, becoming nearly confluent, each at first enclosed in the silvery indusium which when open is notched into little teeth on the margin. (Wood's *Class-Book of Botany*. See also Gray's *Flora of the Northern United States*, Chapman's *Flora of the Southern United States*, and Williamson's *Ferns of Kentucky*.)

LONG the Wissahickon Creek, in Fairmount Park, Philadelphia, and from whence the plant was taken which served us for an illustration, this fern is not uncommon, and it is remarkable that it is almost always to be found on dry walls —that is to say, walls built of stone without mortar—when these walls are in a damp or shady place. The little ledges formed by the stones, and the little spaces between the stones in the wall, are favorite situations with this fern, as also are those parts of the stone breastworks of dams over which the water does not actually flow. Occasionally it is found in the crevices of rocks, but the collector will be much more likely to meet with it in this Park by going to the nearest old wall than to any other place.

It is a very interesting fern, though in all that constitutes beauty, there are others superior to it. One of its happiest phases is towards the fall of the year, when the short barren fronds which form the outer circle bend downwards, forming a sort of rosette, in the centre of which the fertile fronds somewhat erectly stand. In the part of our country where our illus-

tration grew, these barren fronds keep tolerably green till the new ones come in spring, when they give way soon after the appearance of the fertile fronds, and, later in the season, another set of barren fronds appear. Our specimen was taken about the end of May, and from this time to the end of October the student may find along the Wissahickon excellent specimens for study. In other parts of the country the plant does not seem to be so highly favored. Mr. Williamson says, in his "Ferns of Kentucky," "that in that State it grows in exposed situations, being better able to endure the direct rays of the sun than most ferns. But in such places the pinnæ are often very much contracted, so that they seem to be crisp, and apparently rolled up." In Indiana also, according to a correspondent of the first volume of the "Botanical Gazette," who writes from Hanover, it dies away early in the season. He says: "Early in July, while rambling among some of the limestone cliff rocks of the Ohio River, we secured our first specimens of *Asplenium Ruta-muraria*, in beautiful fruit; and since then we have visited the same region every month in order to confirm our observations as to its being an evergreen, and we are now fully convinced of the accuracy of our former remarks on this point. Associated with this species and fruiting abundantly at the same time, we found quite a growth of *Woodsia obtusa*, but by the end of August it had entirely withered away. Its fruiting season begins here probably early in June." Other botanists seem to have very much limited the time when it may be found in fruit. Dr. Darlington in his "Flora Cestrica" gives merely "July;" as also does Professor Asa Gray and Professor Wood, from whom our botanical description is taken. They are probably referring to the time of the fruit's first appearance; but for the benefit of those who are making collections it is well to note how long it endures.

Its botanical history has been varied. The knowledge of the true character of ferns is of comparatively modern date. In the time of Linnæus all the known North American ferns would be referred to a very few genera, possibly only to *Osmunda*, *Pteris*,

Adiantum, *Asplenium* and *Polypodium*. Our plant seems to have been known to Sprengel, a voluminous author of the first quarter of our century, who probably received his specimen from his Pennsylvania correspondent, Muhlenberg, and it is referred to by other writers about that period as *Polypodium obtusum*. Swartz, a well-known botanical authority, especially on ferns, is usually quoted by moderns for the name, but we refer to Sprengel in connection with it as the proper authority. As ferns became better understood it was conceded not to be a *Polypodium*, and it was placed as an *Aspidium*, a genus established by Swartz, under which name it is recorded by Muhlenberg in his catalogue issued in 1813. The genus *Woodsia* had been established by R. Brown before this, and *Polypodium Ilvensis* and others placed therein; and it was not until its true relations were established by Dr. Torrey, that the name it is now known by—*Woodsia obtusa*—came into general use.

The name *Woodsia* is due to Robert Brown, who by it commemorated his friend Joseph Wood, an English botanist who in the earlier part of the present century attained considerable celebrity by a monograph of Roses, and who continued to be a valuable contributor to botanical science up to the time of his death in 1864. The name *obtusum* is obvious, but why given to our species is not so clear. Many of the species with which it was then associated in its early history had pinnules which terminated sharply, and some one of this character nearly allied to it might have suggested a comparison with this species which had them more obtuse. At any rate the comparison which we have now to make with its present family relations, is unfavorable to its name, as some of its sister species have blunter leaves. However it might have passed as an "obtuse-leaved *Polypodium*," it is misleading to call it "obtuse-leaved *Woodsia*," as is often the case in botanical works. It is an illustration of the trouble that arises from the use of specific names which mean something, and is a good point for those who regard personal names as much more satisfactory. Its old name of "Rock Poly-

pody" is also objectionable, though still much in use. As we are left without any acceptable popular name, we would suggest "Common Woodsia," as it is perhaps the best known of all the American species of the genus.

It is widely distributed over the Eastern portion of the United States. Mr. Redfield includes it in his Appalachian group, which comprises those species found in the mountain and hilly regions of the United States east of the Mississippi.

Dr. Gray in his "Manual" locates it on "Rocky banks and cliffs especially northward;" Chapman gives "Rocks along the Allegheny Mountains and northwards;" and Wood refers it to "among and on rocks, New York, to Kentucky and Tennessee." It is possible it may be a little beyond the strict line of the Mississippi, of which botanically the Missouri forms a part, for Mr. James Wilson reports it from Leavenworth, Kansas, and Professor Lesquereux regards it, though with some doubt, as indigenous to Arkansas. Mr. Howard Shriver notes it as abundant in Pulaski county, Virginia.

EXPLANATIONS OF THE PLATE.—1. Medium-sized specimen from Pennsylvania, taken in June.
2. Enlarged pinna in fruit.

PHACELIA BIPINNATIFIDA.

L. PRANG & COMPANY, BOSTON.

PHACELIA BIPINNATIFIDA.

BIPINNATE PHACELIA.

NATURAL ORDER, HYDROPHYLLACEÆ.

PHACELIA BIPINNATIFIDA, Michaux.—A foot or more high from a slender biennial root, erect, paniculately branched, hirsute-pubescent and above mostly viscid and glandular: leaves slender-petioled, green and thin, pinnately three to seven-divided; the divisions ovate or oblong-ovate, acute, coarsely and irregularly incised or pinnatifid; the lower short-petiolulate and the uppermost confluent: racemes loose, seven to twenty-flowered: pedicels spreading or in fruit recurved: calyx-lobes linear, loose, longer than the globular capsule: corolla rotate-campanulate, violet-blue, over half an inch in diameter, with rather short rounded lobes and very conspicuous internal appendages: stamens (bearded) and style usually more or less exserted. (Gray's *Synoptical Flora of North America*. See also Gray's *Manual of the Botany of the Northern United States;* Chapman's *Flora of the Southern United States;* and Wood's *Class-Book of Botany*.)

N Dr. Gray's recent "Synoptical Flora of North America," from which we have taken our botanical description, fifty-five *Phaceleas* are described; and yet less than a hundred years ago not one was known. The first knowledge of them seems to have been gained from Commerson's celebrated voyage, when one which we now know as *Phacelia circinata* was found in the Straits of Magellan. It was at that time thought to be a Heliotrope, and Martin Vahl, a Danish botanist, and one of the most celebrated of that time, named it *Heliotropium pinnatum*, under which it is to be searched for in the earlier writings of Willdenow and of some others. But Jussieu, the well-known botanist of the end of the last century, in his "Genera Plantarum" published in 1789, made a new genus of it, *Phacelia*, which name it still bears. That particular species has the flowers growing in dense bunches or fascicles, and this suggested the name, *phakelos* being Greek for a fasiculus or bunch. This original species is very remarkable

for its great geographical range, being, as "the Botany of the Geological Survey of California" tells us, "common to the two Continents and ranges almost throughout their length," meaning the Northern and Southern portions of this one Continent, for the genus is wholly confined to the Western Hemisphere,—and indeed nearly the whole of them are natives of the United States.

The history of these Phacelias affords a lesson in the laws of nomenclature which it may be well to explain to the student as we pass along. Though we adopt the name first given by the botanist who describes the plant, the description which he gives with his name is not always accepted without modification. For instance *Phacelia* described by Jussieu requires the plants comprising the genus to have corollas "sub-campanulate;" while the genus as now described in the Botany of California has the corolla from "almost rotate to narrow funnel form." Then the stamens according to Jussieu must be "exserted and styles short" to constitute a *Phacelia*, while Dr. Gray in the "Synopsis" makes no generic reference to the stamens or pistils,—indeed some Phacelias, as we now understand them, have not exserted stamens, and as we may see in our plate, have styles that are certainly not short. In fact if a student were to read carefully the description of the genus as given by Jussieu, and then that by Brewer, Watson, or Dr. Gray, he could scarcely believe that the same plants were intended by the same name.

Again we may have a lesson respecting the specific names. The author's name, which we attach to the name of a plant, does not imply that that author was the first who described the species, and who first made it known,—but that he was the person who applied that particular name to the plant. For instance, there is a plant which was known as *Eutoca sericea* of Graham, and Curtis' "Botanical Magazine." But Professor Gray does not recognize *Eutoca* as sufficiently distinct to form a separate genus from *Phacelia*, so he renames it, and it stands as Phacelia sericea of Gray. In this way Graham loses all credit,

and there is nothing whatever to associate his name with the history of the plant, unless some botanical antiquary digs it out from the mass of synonyms under which so much lies buried. It does not seem fair, but it is the law of botany, and indeed it is one of those necessities which must be submitted to. Several supposed genera, as for instance *Cosmanthus*, *Whitlavia* and *Eutoca*, which once had severally many species under their names, are all now regarded by Dr. Gray as sections of *Phacelia*, and this is why the genus seems to have grown so large as it is at the present time.

Our pretty species, *Phacelia bipinnatifida*, has little to boast of in the way of popular history; but it will commend itself to all lovers of wild flowers by its simple beauty. It does not appear to have been noticed by the older botanists; Michaux in his "Flora of North America," in 1803, being the first to name and describe it, probably from Kentucky specimens. It is subject to some variations, one of sufficient character to have been regarded as a distinct species. This is *Phacelia brevistylis* of Buckley, though now only a variety of Gray, while still retaining its original specific name. This particular variety was found in Alabama by Professor S. B. Buckley, now the State Geologist of Texas. In its geographical relations it is found according to Professor Gray, in his "Synopsis," "in the shaded banks of streams, from Ohio and Illinois to Alabama." It does not seem to extend to the lower lands near the coast, and is probably not usually met with by collectors along what might be properly called the seaboard States. Darby, in his "Botany of the Southern States," does not include it even in so late an edition as 1866. Dr. Chapman has it in his "Flora," but confines it to "shaded banks in Alabama and North Carolina." Professor Wood finds it in "woods and hill-sides, Pennsylvania, to Indiana (Plummer), Missouri and Ohio." We may gather from all this that it favors a mountain region, and is partial to the shade of open woods. In the "Botanical Gazette" for 1876, the editor notices very singular behavior in the plant in his section, Jeffer-

son county, Indiana. He says: "*Phacelia bipinnatifida*, Mx., seems to be very uncertain in its growth. For two seasons I watched closely for it and did not secure a single specimen; but this spring our hill-sides are fairly blue with it, and its presence may be perceived by the peculiar pungent odor rising from it." This periodicity in their appearance has however been noted in connection with some other plants; but whether it be that the seed retains its vitality for several years until a favorable season occurs for its germination, or whether it be that there were a few plants that escaped the researcher's observation, which perfected seed, and a favorable season following encouraged to a more than usual growth, has never been clear to the mind of the writer, and renewed observations are needed.

It is a biennial and has often been introduced to culture, but has never become a standard stock in seedsmen's catalogues, showing that it does not remain long in gardens. Possibly its shade-loving character, as judged from its native locations, renders it impatient of open sunny garden borders; but its beauty when under favorable circumstances should make it worth while to attempt to humor it.

The drawing for our plate was made from a plant under Mr. Dawson's charge in the Arnold Arboretum of Cambridge, Massachusetts.

RUDBECKIA FULGIDA.

L. PRANG & COMPANY, BOSTON.

RUDBECKIA FULGIDA.

BRILLIANT CONE-FLOWER.

NATURAL ORDER, COMPOSITÆ.

RUDBECKIA FULGIDA, Aiton.—Stem hirsute with rigid hairs; branches slender, naked above; leaves strigous-pubescent, remotely dentate, radical petiolate, ovate, five-veined, cauline lance-oblong, tapering to the sessile, sub-clasping base; scales oblong, spreading, as long as the spreading rays; pales glabrous, linear oblong, obtuse. Stem from one to three feet high. Rays twelve to fourteen, scarcely longer than the leafy involucre, deep orange-yellow. (Wood's *Class-Book of Botany*. See also Gray's *Manual of the Botany of the Northern United States*, and Chapman's *Flora of the Southern United States*.)

THE genus *Rudbeckia* to which our present illustration belongs has received no common name from the common people; but botanists have called it the "Cone-flower," because the conical receptacle, or that which supports the centre of the flower, is more conical than that of the sun-flowers (*Helianthus*) with which it was thought to have some relationship many years ago. It is proper however to remind the reader that names must be regarded as but names, and little more; for in naming a plant from some peculiarity we can never know when another one may be discovered having the same character though differing in something else. Indeed it often happens that a new plant, waiting for a name, has a known peculiarity much more strikingly developed than its elder sister. We cannot however alter names on this account, because such a change would be a greater evil than the misunderstandings from the application of the term. It has therefore become the habit to regard lightly the meaning of the name so far as identification of the plant is concerned. This is worth remembering when we think of "Cone-flower" in connection with *Rudbeckia*, for there

are now genera not far removed from *Rudbeckia*, which have the receptacle as much and in some cases more conical than these.

The conical receptacle must have attracted considerable attention from the first, for before the genus was named *Rudbeckia* by Linnæus it was described as *Obeliscotheca* by Sebastian Vaillant, a French botanist, the name being from the Greek *obelisk*, and *theca*, a cell—the little cell-like florets being arranged on the obelisk or cone-like receptacle. But Linnæus when he reformed botanical nomenclature ruled that generic names, composed of two distinct nouns, or of two words one of which is entire, if ever allowed, were not to be imitated; and we can readily understand why *Obeliscotheca* should be replaced; so in 1737 in the "Genera Plantarum" of Linnæus we find the genus dedicated to the Rudbecks "Olao patri, et olao filio"—Olaus the father and Olaus the son—and not merely "from M. Rudbeck, a Swede, author of a Botanical work entitled 'Campos Elysius,'" as one of our text-books tells us. These Rudbecks were the predecessors in the Chair of Botany at Upsal in Sweden, and there seems to be no special reason why their names should be connected with these plants beyond the fact that Linnæus had a high regard for them. It is a distinctively American genus, having no representatives in the Old World, and to us in these days it may be allowable to regret that all plants of this character did not commemorate the names of those in immediate connection with the knowledge of American plants.

Rudbeckia has many points of interest worthy of the student's attention, which, though they can be observed more or less in many other genera, are striking here. We may remember that a flower head in *Compositæ* is as if a piece of wire were drawn round in many coils; and that if we could draw out this wire-like coil, it would appear as any ordinary stem growth—say a long willow branch, with a single flower in the axil of each leaf. As we know in some plants the leaves remain almost unchanged as bracts, and in other cases they are wholly wanting, as is generally the case in the cabbage tribe; so in Composites the

same general principles exist. What are called the scales of the receptacle are really floral bracts, which in some cases are wholly obliterated in the drawing in of the spiral coil to form the compound head. In this genus *Rudbeckia* these scales or bracts are very prominent in the centre of the flower, and it is not till the divisions of the little florets are ready to expand that we see them above the tips of the scales. Again in some composites that have a sort of spicate habit, the plant will complete its growth before any flowers expand, and then it commences the blossoming from the top downwards; while others flower from below upwards as the flower shoot grows. These varying phases of growth also have a counterpart in these single heads. Sometimes there is more activity in the centre of the flower than in the circumference, and these varying phases make differences in the sexual characters. In some it results in giving the ray florets an advantage; in *Rudbeckia* the ray will be found quite barren, rarely producing the vestige of a pistil, and no sign of a stamen; while the central or disk florets are perfectly hermaphrodite, and alone bear perfect seed.

The development of the florets in our present species, *R. fulgida*, is very interesting. The corolla appears to be forced open by the growth of the pistil, which as it elongates, pushes on before it an immense quantity of beautiful yellow pollen. The first knowledge we have of the opening of the flower is from the appearance of this pollen through the divisions of the corolla. This profusion of pollen seems very welcome to a large number of insects, is collected at once, and so completely that it is only by putting a flower under protection that the pretty little crown of yellow can be seen and the progress of the opening florets traced. When it is remembered that a single grain of pollen is sufficient to fertilize a single ovule, which finally becomes the seed, one is lost in wonder that so much effort should be spent on its production. It may be in some way connected with the plant's own good, or it may be the result of a far-reaching Omnipotence making the plant work for

the good of other members of creation, or even for the future of its own race, beyond its own immediate individual interest.

Our *Rudbeckia fulgida* has the general aspect of some of its neighbors, and especially of *R. hirta*, from which however its smooth chaff is a good distinction. The chaff of *R. hirta* is hairy at the summit.

In his "School Botany," Dr. Gray gives a list of "the commonest species," and as ours is omitted, we may regard it as rare. It is indeed much more limited in its geographical range than some of its kindred, yet one who has seen it so abundantly as it is found in the meadows of Eastern Pennsylvania may well wonder why it has not spread more elsewhere.

Pennsylvania seems its northern limit. It extends to Central Ohio, and then southwesterly to Arkansas, which is its western line. From this it extends southeasterly to Florida, keeping, Professor Wood says, chiefly to the more elevated districts.

EXPLANATIONS OF THE PLATE.—1. Root leaves. 2. Upper portion of stem with flowers. 3. Disk floret with akene and chaffy scale at the base. 4. Disk floret opened, showing the short stamens through which the pistil has protruded. Pollen grains on the expanded lobes. 5. Pollen grain magnified.

CYPRIPEDIUM ACAULE.

L. PRANG & COMPANY, BOSTON.

CYPRIPEDIUM ACAULE.

STEMLESS MOCCASIN FLOWER.

NATURAL ORDER, ORCHIDACEÆ.

CYPRIPEDIUM ACAULE, Aiton.—Scape leafless, one-flowered; leaves two, radical, elliptic-oblong, rather acute; lobe of the column roundish-rhomboidal, acuminate, deflexed; petals lanceolate; lip longer than the petals, cleft before. Leaves large, plaited, and downy. Scape ten to fourteen inches high, with a single lanceolate bract at the base of the large, solitary flower. Sepals half an inch long, the two lower completely united into a broad lanceolate one beneath the lip. Petals lateral, wavy. (Wood's *Class-Book of Botany*. See also Gray's *Manual of the Botany of the Northern United States;* and Chapman's *Flora of the Southern United States.*)

THIS species is one of the best known of the moccasin flowers, and has received many popular names. Among them may be noted purple Lady's-slipper, Noah's ark, and Dwarf Umbil, as perhaps the best known. Even the botanists have multiplied their special names; and while some write of it under the title of *Cypripedium acaule*, as given at the head of this chapter, there are others who always refer to it as *C. humile.* The latter name was given to it by Salisbury in the "Transactions of the Linnæan Society of London," and the former by Aiton. Of the modern American authors, Barton, Darby, and others use Salisbury's name; while Gray, Chapman, and Wood employ the name given by Aiton. The two names must have appeared about the same time at the end of the last century. The rule is to take the oldest. Our modern botanists are generally careful in deciding these questions, and we presume *C. acaule* will prevail.

This species of moccasin flower has been known for a long time to botanists, and a figure of it appears in Curtis' "Botanical Magazine" in 1792. The editor says: "We have not figured

the present species of *Cypripedium* so much on account of its beauty as of its rarity, for it is far less handsome than any of the other species that we are acquainted with." It may be noted here that the species is very variable, and Mr. Curtis had but one of the poorest of the varieties to draw from. Our readers, looking at our drawing, will probably pronounce it a beautiful species. We have often found taller specimens on the hills bordering the Susquehanna river in Pennsylvania, besides larger and more vigorous every way than that which we have selected for illustration. The color of the one in our plate is, however, as rich as in any of the forms usually found.

There are some special points in the structure of this *Cypripedium* which gives its beauty a peculiar interest among moccasin flowers. The peculiar slipper-like lip, which is so striking in other species, is modified in this one by having, as Professor Wood says, "the lip cleft before"—that is to say, the shoe has been slit down along the upper portion of the foot! This makes it look more like a shell than a slipper. Another peculiarity is that it is stemless—that is, the flower stalk arises directly from the root stock, and is not supported on a leafy stem, as in other species. Herein is found the derivation of both of its names—*acaule* and *humile;* each signifying a lowly condition of existence. It grows naturally under trees in rather dry situations. Dr. Gray in the "Manual" says it is found in "dry or moist woods, under evergreens." If this mean that it is only found under evergreens, the observations of that distinguished author are at variance with those of other collectors. In Pennsylvania the writer has but once collected it under hemlock spruces. Its general place of growth is in woods of deciduous trees, and in such situations it is usually found in New Jersey. Though in these places it is somewhat gregarious, that is to say, a great number may be often collected in one wood; the individual plants are much scattered, and are generally at least several feet apart.

One of the most interesting branches of modern botanical study relates to the manner in which flowers receive their pollen.

In some plants the floral arrangements are such that the flower cannot receive its own pollen, and it seems to some botanists that this is in accord with a pre-arranged plan to compel the use only of pollen brought from other flowers by insect aid. In this study *Cypripedium* has taken a prominent part, Dr. Gray, in "Silliman's Journal" for 1867, deciding after a careful examination of the structure "in all the species, it is impossible that fertilization should be effected without extraneous aid." Our present species, *C. acaule*, is one that was the especial object of Dr. Gray's examination. He shows that its pollen is very sticky, and is carried away either bodily or piece-meal on the heads or other parts of insects. He describes how they enter the flower by one lateral opening in search of sweets with the pollen on their heads rubbing against the stigma, and escaping by the hole on the other side! Dr. Gray says he has not detected insects actually at work in this way, but he gathers from their traces and from a variety of facts that, "even in *Cypripedium acaule*, the insects act in the manner described." The study of these singular arrangements, some connected especially with the plant we have illustrated here, led him to say, "Hereafter teleology must go hand-in-hand with morphology; functions must be studied as well as forms, and useful ends presumed, whether ascertained or not, in every permanent modification of every structure."

It is remarkable that the attempts to cultivate this plant, extending over the past one hundred years, have met with little success. According to Aiton, the plant was first introduced into English gardens in a living state "about 1775 by William Hamilton, Esq.," and this is generally followed by chronologists. But we find by Darlington's "Memorials" that in a letter to Peter Collinson dated November, 1761, John Bartram writes of having sent roots of it to his friend. From that time till now the stock in Europe has been kept up mainly by importation of full grown roots from our land. Mr. Robinson, in his interesting "Alpine Flowers," gives minute directions for its successful culture, but concludes: "It may be propagated by division, but the

plants in the country at present are too small and puny to bear this." In our own country a correspondent of the "Bulletin of the Torrey Botanical Club," in the third volume, remarks: "I cannot keep *Cypripedium acaule*, although I have seen it in nearly pure dry sand and in wet sphagnum (moss.) It is curious that *C. acaule* has only one bud to each plant." So far as this last point is concerned, it will be noted that the one illustrated has two, though only one flowered.

The purple moccasin flower is rather widely distributed. We have special notes of its being collected in almost all the seaboard states from Maine to North Carolina. It has been found in Kentucky, and in the northwestern part of the United States as far as Minnesota.

EXPLANATIONS OF THE PLATE.—Complete plant, a Massachusetts specimen furnished by Mr. Jackson Dawson. 2. The column, or central part of the flower enlarged, and showing the united mass of stamens with the pistil, or, as it is said, its "gynandrous" character.

Camptosorus rhizophyllus.

L. Prang & Company, Boston.

CAMPTOSORUS RHIZOPHYLLUS.

WALKING-LEAF.

NATURAL ORDER, FILICES.

CAMPTOSORUS RHIZOPHYLLUS, Link.—Fronds auriculate-cordate at the base, lanceolate, with a long slender acumination which often takes root at the apex. Frond two to nine inches long, and half of an inch to an inch wide, evergreen, sometimes bifid with two acuminations; stipe one to four inches long, slightly margined above, smooth. Sori often half an inch in length. (Darlington's *Flora Cestrica*. See also Gray's *Manual of the Botany of the Northern United States*, Chapman's *Flora of the Southern United States*, and [as *Antigramma rhizophylla*] Wood's *Class-Book of Botany*. Also Eaton's *Ferns of North America* and Williamson's *Ferns of Kentucky*.)

THOSE who are fond of wild Nature, and who love to take her just as she is, fresh from her Maker's hands, often have to thank their favorite poets for beautiful thoughts which seem to deeply engrave the scene on the memory, and which enable them to recall the pleasant picture at any future time. We have just such an impression as we are writing these lines on the Walking-leaf Fern, though the reality passed many years ago. It was on the Lehigh river in Northern Pennsylvania, and far from human habitations. The Pine trees interlaced their branches, and little vegetation could exist in the shade beneath; only the trailing yew, and, everywhere on the huge scattered rocks, the Walking-leaf fern. It seemed the very suggestion of the invocation of the well-known English poet Thomson—

> "To Him, ye vocal gales,
> Breathe soft whose spirit in your freshness breathes;
> Oh, talk of Him in solitary gloom!
> Where, o'er the rock, the scarcely-waving Pine
> Fills the brown shade with a religious awe."

It is indeed generally in these sombre, awe-inspiring, rocky

woods that our plant is found in Pennsylvania; and in other states some similar situation is usually its home. The specimen for our illustration was gathered near Philadelphia, along the Wissahickon—

> "In the green valley, where the silver brook,
> From its full laver, pours the white cascade;
> And, bubbling low amid the tangled woods,
> Slips down through moss-grown stones with endless laughter;"

and where, if Longfellow had taken this pretty picture from the very spot, he might have noticed the Walking-leaf on the moss-grown stones among which here at least it loves to grow.

There has been much controversy as to the kind of rock on which the plant is found growing, some writers having claimed for limestone the sole privilege of finding it a home. But great numbers of observers have since recorded locations on sandstone rock; and the specimen we illustrate was taken from gneiss, a variety of granite rock, on the western side of the Wissahickon before referred to. That it was well satisfied with its location is seen by its picture, which is a fair average of its condition as found anywhere. It is however a very variable fern. Many collectors have found specimens with double fronds, one of the auricles or ear-like lobes at the base having grown out to almost the extent of the main blade, and rooting at the ends like its parent, or, as in such cases one might almost say, sister frond. Where our specimen was found one frond was gathered which had both auricles developed into fronds, not as long as the central one, all three rooting at the ends, and having a remarkably trifid character. Then while there are these variations in the line of division, there are often found tendencies in the opposite direction, that is to say, to be entire leaved.

Mr. E. A. Rau, of Bethlehem, Pennsylvania, contributes to the first volume of "The Botanical Gazette" an account of many varying forms, among others "some bearing sori, in which the frond is remarkably short, oblong, obtuse, widening at the base into obtuse auricles." When it is noticed, as in our plate, how long and tapering are the terminations of the fronds,

it will be understood how different in general appearance an oblong obtuse frond must be. Mr. Jacob Stauffer collected a form at Mount Joy, according to Dr. Gray, with roundish sori and inconspicuous veins.

There is one character which is generally constant: the veins seem to cross each other's path, and form a sort of net-work, or as it is technically called, they anastomose. The earlier botanists had overlooked or placed little value on these characters from the veins of ferns, and hence our species was called by Linnæus *Asplenium rhizophyllum*. But the moderns have restricted *Asplenium* to those which have free veins; that is to say, veins which continue their whole length without touching each other. Our species was taken from *Asplenium* in 1833 by Link, a German botanist, and called *Camptosorus*, the name being derived from two Greek words, signifying a bent heap, and this because the sori, or the little long heaps of sporangia, are "generally curved," according to John Smith; or as Professor Eaton explains, "the indusia of the areoles next the midrib are also often bent at an angle, and the two portions plainly united." This manner of veining—called in botany, venation—has not proved so constant a character in ferns as it was expected to be by those who first perceived its importance in classification.

In the present instance we have a plant so remarkably near *Asplenium pinnatifidum*, that it is difficult for the common observer to see any material difference till he is told to notice whether the veins anastomose. On this anastomosing of the veins, which no morphologist would regard as of great moment, our plant is placed in a genus almost by itself. Professor Eaton is no doubt fully justified in his remark that it is by no means impossible that *Camptosorus* will be again remanded to *Asplenium*, "for it is now pretty generally admitted that differences in venation do not constitute valid generic distinctions;" and one might add scarcely specific differences either, for in many cases the individual plant varies in this respect. In our plate the frond (Fig. 4), a younger and barren one, is much

more reticulated, or net-veined than the maturer and fruitful ones (Fig. 2). Indeed it is our experience that when a frond is abundantly fruitful, the veins are often wholly free. It may be also remarked that in the enlarged drawing at p. 75 of Mr. Williamson's "Ferns of Kentucky," the veins are all wholly clear of each other.

Asplenium pinnatifidum is remarkable for its fertility. Often early formed and small fronds are as completely covered with sporangia as larger and more recent ones, and it has little disposition to make terminal buds; while the *Camptosorus* is comparatively a sparse-fruiting fern, and makes up for this by its power of increasing from terminal buds (whence comes its name *rhizophyllum*). It would be curious if it should ultimately prove that the one form has been evolved from the other by a sort of difference of opinion, as one might almost say, as to the best methods of reproduction, and that the greater divarication of the veins in the walking-leaf (which is really all the difference) is a mere incident in the reproductive question.

The *Camptosorus* under its older names has been long known to botanists, having been noticed by Ray, Morison, Plukenet, and others of the early English authors of the first part of the eighteenth century. Gronovius had specimens sent to him both by Clayton from Virginia and Colden from New York. Michaux found it "not abundant" from "Canada to Tennessee." Dr. Gray says its home is from "west New England to Wisconsin and southwards." The writer of this has found it abundantly on the rocks running from east to west across the state in Southern Illinois, and Professor Lesquereux found it in Arkansas.

EXPLANATION OF THE PLATE.—1. Complete plant. 2. Fertile frond. 3. Rooting point of one frond. 4. Barren frond conspicuously netted-veined.

POLEMONIUM REPTANS.

L. PRANG & COMPANY, BOSTON.

POLEMONIUM REPTANS.

CREEPING GREEK VALERIAN.

NATURAL ORDER, POLEMONIACEÆ.

POLEMONIUM REPTANS, Linnæus.—Smooth and succulent; branched and leaning; leaflets five to eleven, usually seven to nine, mostly opposite, the terminal one lance-obovate, about an inch long; common petiole half an inch to two inches in length below the leaflets, slightly winged, pubescent-ciliate; corymbs few-flowered, nodding; corolla blue, about three times as long as the calyx; the lobes short, obovate, rounded. Capsule on a short stipe, in the enlarged, persistent, veined, green, and somewhat membranous calyx. (Darlington's *Flora Cestrica*. See also Gray's *Manual of the Botany of the Northern United States*, Chapman's *Flora of the Southern United States*, and Wood's *Class-Book of Botany*.)

HE Greek Valerians, known botanically as *Polemonium*, form a genus of great interest to the American student, having been selected by Jussieu, one of the chief founders of the natural system of Botany, as the type of the natural order *Polemoniaceæ*. The original Greek Valerian, *Polemonium cœruleum*, is a native of northern Europe and Asia; but it is also indigenous to our own country, and by far the greater bulk of the whole order are American. Indeed, we may regard *Polemoniaceæ* as in the main an American order of plants. Botanists regard them as somewhat allied in structure to the Bind-weeds or *Convolvulaceæ*—but they are very different in their aspect. On the other hand, they have much the general appearance of the *Hydrophyllaceæ* or "water-leaf" family, but differ essentially in placentation, or manner in which the seeds are connected with the ovarium. In *Polemoniaceæ* the placenta is axile, while in *Hydrophyllaceæ* it is central, in which case the seeds do not seem attached to the sides of the capsule, but to a soft mass in the centre. The two great genera of the eastern United States are

Phlox and *Polemonium*. *Polemonium* is readily distinguished from *Phlox* by its bell-shaped corolla, while, as is well known, the *Phlox* has its corolla mainly as a long slender tube.

In regard to the history of the name, *Polemonium*, the student may have some ground to complain of the text-books, as they so often have had to complain in similar cases. A French author of the last century says: "Pliny tells us that many kings disputed the honor of having found the polemonum, which gave to the plant the name of Polemon, signifying war;" and Sir William J. Hooker tells us that "it was named from polemos, *war*, according to Pliny this plant having caused a war between two kings who laid claim to its discovery." The explanations read as if "this plant," *Polemonium cæruleum* being in question, was the plant the "two" kings or the "many" kings fought over; but the plant is not a native of Greece, nor is it probable that Pliny had any knowledge whatever of "this plant," and it is much better when inquiring why Tournefort called the plant *Polemonium*, to say with Dr. Gray in the "Manual" "an ancient name of doubtful application." And in his more recent "Synoptical Flora of North America," he even suggests that it is more probable Tournefort had in his mind to commemorate Polemon, the celebrated Athenian scholar, who succeeded Xenocrates in his famous school.

The common name, Greek Valerian, is more easily traced. In older times, when the structure of plants was not well understood, groups were formed according to their external resemblances. There is much in the habit of the genus to suggest the Valerian, and thus we find them in the writings of the old botanists. Dœdens, who wrote in 1616, calls it *Valeriana græca*, and Bauhin, thirty years later, *Valeriana cærulea*, though he takes occasion to remark that it "has nothing in common with the Valerian, except something in the shape of the leaves." Finally taken from the Valerians, and given a separate name, *Polemonium*, by Tournefort, we can at least see exactly how it came by the name of Greek Valerian.

The unfortunate confusion in the name results, as such seemingly trifling mistakes often do, in errors of great consequence. The true Valerians have great medical virtues, perhaps great enough to warrant ancient kings fighting about them, and thus we find the old Herbalists, with Culpeper leading, assuring us that the "Greek Valerian is under Mercury, and is alexipharnic, sudorific, and cephalic, and useful in malignant fevers and pestilential distempers;" but as soon as it was proved not to be a Valerian, it was found that the virtues were wholly imaginary.

Our species has been long known to botanists, being referred to by Gronovius in Clayton's early collections from Virginia. It differs from the older known *Polemonium cœruleum* in its creeping habit, besides in other characters, and this characteristic suggested the name *reptans*, or "creeping Greek Valerian." In Pennsylvania, where it is common in alluvial bottoms along rivers and water-courses, it is often called "Forget-me-not;" but as it has nothing in common with

> "The flower which has a flower as bright as noon,
> And leaf as delicate as softest satin,
> Called the Forget-me-not, but known as well
> By twenty names I cannot stop to tell,"

as Sargent sings of it, it would be as well to let it drop. "Jacob's Ladder" is sometimes used because of its ladder-like leaf. It is well to refer to these names in a history of the plant; but "creeping Greek Valerian" will probably prevail. It is one of the earliest of our spring flowers, and brightens with a singular beauty the half-shady places wherein it loves to grow. Longfellow, in his beautiful poem, "Flowers," scarcely had this plant in his mind when he wrote—

> "Everywhere about us are they growing,
> Some like stars to tell us Spring is come;
> Others, their blue eyes with tears o'erflowing,
> Stand like Ruth among the golden corn;"

as the "blue eyes" of our species seldom if ever look at us from grain-fields; but as we may often see its beautiful sky-blue flow-

ers, dotted with the pure white anthers growing along the Wissahickon, and telling us that "Spring is come," there is a something impressive which invariably associates them with Longfellow's lines. It is a plant easily found by the lover of wild flowers, as it has a rather wide distribution in all the states east of the Mississippi except those in the extreme north-east, and those bordering on the Gulf of Mexico.

The creeping Greek Valerian is a very easy plant to cultivate, and indeed it is when growing in the country gardens of Pennsylvania that it generally receives the name of "Forget-me-not." A peculiarity of cultivation is that while the amount of foliage is increased, there is seldom any more increase in the quantity of flowers than we find in a wild state; so that a good strong stock in its native place of growth seems more beautiful than one growing in a garden. In cultivation, however, we find more variety in the shades of color, as they happen to be selected by those who bring them in from their wild locations. It is not uncommon to find flowers of a brighter blue than we have selected for our plate. On the other hand, they are often seen of a pure white. In any condition the plant would be regarded as pretty, and will bear a strict scrutiny in regard to some claim to beauty. The general tendency in the habit of growth is towards straight, slender lines, without any great variety in length or direction—but the roundish flowers make a fair contrast to the straight lines, and the gentle curve caused by the weight of the flowers expresses unity in the general effect. Still, it must be admitted that its claim to be a pretty flower lies chiefly in the contrast which the blue makes with the white anthers.

CYPRIPEDIUM PUBESCENS.

L. PRANG & COMPANY, BOSTON.

CYPRIPEDIUM PUBESCENS.

LARGE YELLOW MOCCASIN FLOWER.

NATURAL ORDER, ORCHIDACEÆ.

CYPRIPEDIUM PUBESCENS, Willdenow.—Stem leafy, leaves broad-lanceolate, acuminate; sepals lanceolate; lip shorter than the linear, twisted petals, compressed laterally, convex both above and below; sterile stamen triangular, acute; plant pubescent. Stems usually several from the same root, one foot or more high. Leaves three to six inches long by two to three wide, many-veined, clasping at the base. Flower mostly solitary. Segments four, greenish with purple stripes and spots, the lower bifid, composed of two united sepals, the lateral two to three inches long by three lines wide, wavy and twisted. Lip moccasin-shaped, bright yellow, spotted inside, with a roundish aperture. (Wood's *Class-Book of Botany*. See also Gray's *Manual of the Botany of the Northern United States*, and Chapman's *Flora of the Southern United States*.)

HE large yellow is one of the best known of the Moccasin Flowers; and yet there are interesting facts connected with it that do not seem to be well known to botanists, or at least are not noted in the descriptions some of them give. These little facts, however, teach the student some interesting lessons, and it is chiefly because Professor Wood has noted some of these that we have selected for our chapter the description from his work. For instance, we read in most accounts of our species that the flowers are bright yellow, that the petals are linear and twisted, and that the lateral sepals are of such a given width; and the student is liable to suppose that nature has an exact character for her species, whereas her limits are elastic, and we may almost always look for some variations from even the best written descriptions without any ground for imagining we have a new species because the plant in question and the most popular description do not exactly correspond. Our present illustration of the large yellow Moccasin Flower will be found

to vary somewhat from many descriptions, and from some of the drawings of which there have been quite a number given during the past century. For instance, the sepals—which are the two external portions forming the upward and downward back portion of the flower—are scarcely wavy. nor are the two narrower portions (petals) in front, and on each side of the "moccasin" or lip; again, the flower is not "bright" yellow in our specimen, and there is a faint trace of white on the upper portion of the "foot." The reader knows that all these parts of the flower were originally designed by nature to be ordinary green leaves, and that it was only by a subsequent change of plan that she altered them into sepals, petals, and other floral parts; and it is interesting to note that when she goes to work on this change of leaves to flowers, she generally carries along some peculiarities especially belonging to the leaves. Now in the usual forms of the large yellow Moccasin Flower which we meet with, we find the leaves very much undulated, botanically speaking, or, as we may say, with wavy and twisted margins; and it is in the cases where they are the most waved that we have the greatest twisting of the floral segments. In our specimen, where we see little twisting of these parts, we have correspondingly less waviness in the leaf margins. It is a very interesting example of the correspondence of character in the leaves, and in the floral parts which have been made from the leaves, though in so many other particulars they have been led to diverge from each other.

The large yellow Moccasin Flower is very closely allied to the *Cypripedium Calceolus* of Europe, which gave the name of "Lady Slipper" to the family; and by this name the botanical *Cypripedium* was suggested to Linnæus. Indeed, the earlier American botanists wrote of our plant as being the same, and as *C. Calceolus* it is referred to in some of their writings. It may, therefore, lay claim to a share in whatever of popular history relates to that species. In the past ages, when everything common was invested with religious associations, we find the

Lady's Slipper written of as "our Lady's Slipper," and to this day the popular names in France are "Sabot de la Vierge" and "Soulier de Notre Dame," names having the same signification.

It is interesting to note how very much our knowledge of plants has increased in modern times, and especially our knowledge of the structure of orchids—the family to which *Cypripedium* belongs. One of the earliest of American botanists, Dr. Cadwallader Colden, of New York, writing, about 1744, to the celebrated Gronovius, remarks of *Cypripedium*, "two stamina seem not sufficient to me to impregnate the great quantity of seed contained in the capsule." Now we know that a mass of pollen is made up of innumerable grains, every one of which is equal to the fertilization of a single ovule. It is believed that the flowers can be pollenized only by the aid of insects, and it is remarkable that a plant is rarely found which has flowered and not perfected seed, and yet again it is singular that insects are rarely seen visiting the flowers. Dr. Asa Gray, who once made a special study of these plants with a view to ascertain their relation to insects, notes that though he found insect traces he was never able to detect the insects actually at work. The chapter of these remarkable circumstances, however, is not yet complete, for we have to note that the seeds are very small, and that an immense number are produced in each capsule, while notwithstanding the trouble nature seems to have taken to arrange that seed shall only follow the visits of insects to the flowers, scarcely any of these seeds grow. We may note a group of a few dozen plants in any one place, and for years afterwards, with little increase in number in all that time. So rare is it that we have any evidence of seeds of these plants growing in their native places, that Dr. Jonathan Stokes, the botanist of the olden time, after whom our *Stokesia* is named, was led to exclaim that "Gardeners might make the botanists amends for rooting out these rare wild plants in their natural places of growth and at the same time enrich themselves, if they would prove by experiment that one at least of the orchis tribe

could be raised from seed." By very nice care the tropical epiphytal, or tree-loving kinds, have been raised from seed—but we believe Dr. Stokes' remarks have yet much force so far as the natural growth of these hardy orchids from seeds is concerned. Of the large yellow Cypripedium great numbers of plants are annually shipped to Europe by dealers, and for want of nature filling the gap by new seedlings, the species is now rarely found where florists have a chance to dig up the roots.

Our specimen was furnished for drawing by Messrs. Hoopes Bros. & Thomas of West Chester, Pennsylvania, who report that it was a root received from Massachusetts.

In Pennsylvania it flowers in May, and grows in rather moist, bushy places, or in open woods. Farther north it is found as late as June. It is met with in most of the Northern States as far west as Minnesota, and southward to Kentucky and Georgia.

EUPHORBIA MARGINATA.

L. PRANG & COMPANY, BOSTON.

EUPHORBIA MARGINATA.

SNOW ON THE MOUNTAIN.

NATURAL ORDER, EUPHORBIACEÆ.

EUPHORBIA MARGINATA, Pursh.—Leaves oblong-lanceolate, sub-cordate, sessile, acute, mucronate, entire on the margin, glabrous; umbel three-rayed, once or twice dichotomous; involucrate leaves oblong, colored and membranaceous at the margin; inner segments of the floral involucre roundish; capsule hairy-pubescent. (Wood's *Class-Book of Botany.*)

OME of the plants now recognized as *Euphorbia* were also known to the ancients, and references to them occur in some of the oldest writings extant. The genus comprises an immense number of species; and yet, as intelligent men penetrate unexplored portions of the globe, they occasionally find new kinds to add to the already large list. Great numbers of them prefer hot and dry places, and so as what are called the deserts of our country became explored, and plants not known before were discovered, new Euphorbias of all others would be likely to be found among them. In the early part of the present century very little was known of the plants growing beyond the Mississippi or the Missouri. It was not until 1814 when Pursh issued in London his work on the "Flora of North America," that we had any knowledge of the flowers of this part of our country, and it is in this work that our present subject was first named and described. But though the credit of establishing the name may be given to Pursh under botanical rules, it does not follow that he was the original collector of the plants he wrote of. He was never beyond the Mississippi river, and he was indebted to the expedition of Lewis and Clarke for much of his material. Some of the dried specimens of this expedition fell into his hands, and were used by him for his

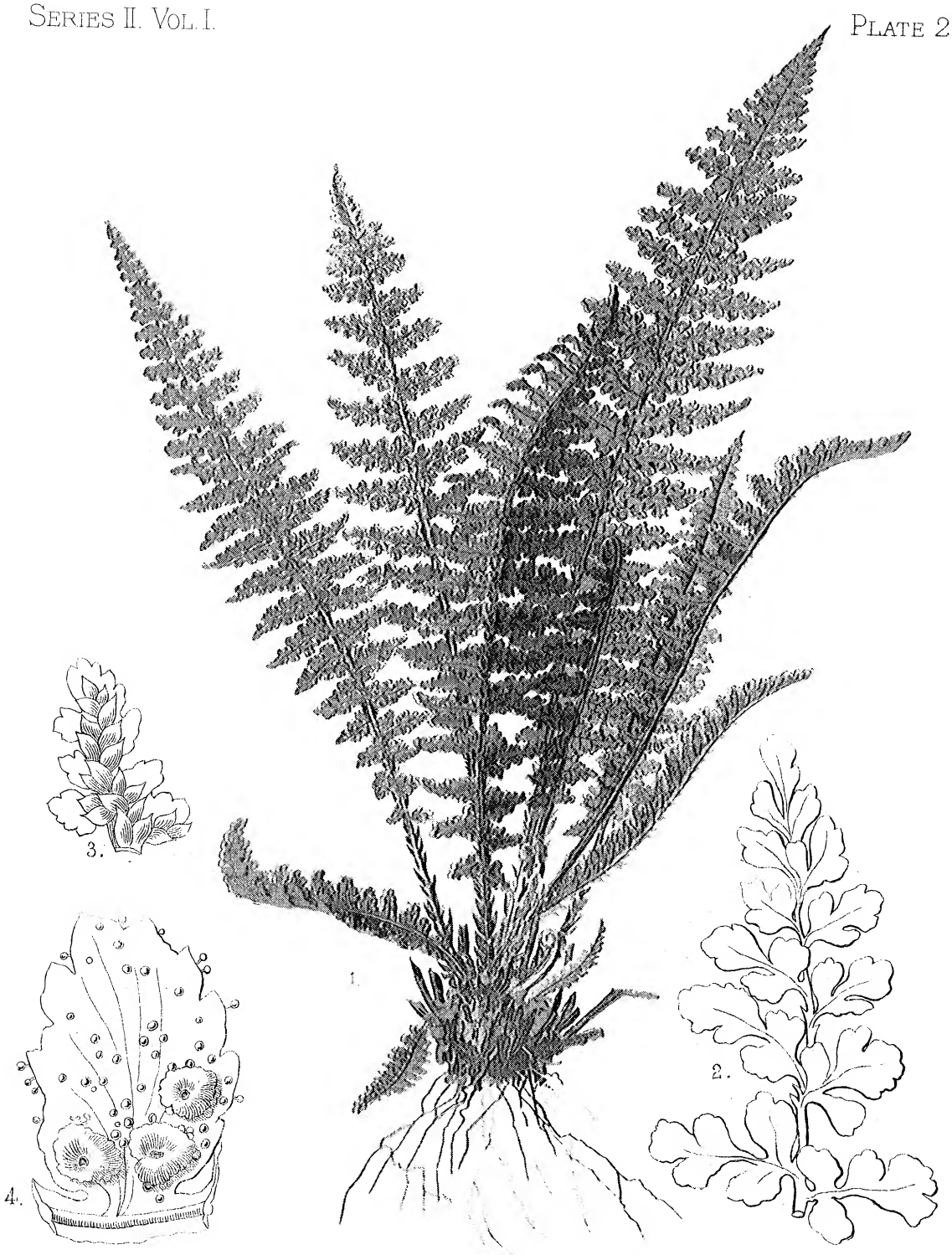
work. Reference is made to this fact in order to furnish a lesson in Botanical Geography. The home, as we may say, of our plant about fifty years ago, was in the drier parts of our country, between the Missouri and the Rocky Mountains. Since that time it has progressed eastward rapidly, and it is more than probable that at no very distant date it will be found wild up to the shores of the Atlantic Ocean. Professor Wood, from whose "Class Book" we have taken our description, notes, in 1861, that it was wild abundantly on the shores of the Kentucky river, at Paris, in Kentucky State. In 1872, Professor Bessey notes, in the "American Naturalist" for that year, that it was then in great abundance in west and northwestern Iowa, and Mr. Arthur includes it now in the regular catalogue of the Flora of that state; and in the "Bulletin of the Torrey Botanical Club" for 1876, we find Mr. R. Burgess noting that it was abundant along the Missouri valley in Missouri. In regard to Indiana, notice of its existence is recorded, so early as 1870 in the "Botanical Gazette," as abundant at Madison; and the same season its first appearance at Logansport is recorded in the same magazine. This shows how it is marching on to the acquisition of more territory, and as of course only one plant can exist on the same spot, other species of plants are eventually crowded out by the intruders. But it is quite probable that the plant did not exist in any great abundance, even in its natural home, till civilized man came to its aid. It does not flourish remarkably well when struggling with the regular flora of the same region; but when the railroad was made and the earth in various ways disturbed, the plant appeared in such abundance, that the untutored observers thought it must have sprung from seed that had lain in the ground dormant for centuries. But the facts in these and similar cases are that a few plants spring from chance seeds, and, being so few, produce seeds unobserved; these seeds falling on soil just suited to them nearly all grow, and then by their unusually large numbers attract attention. It has in this way become particularly

attractive to the traveller over these far western railroads, as it is in its best dress only along the lines where the soil has been disturbed.

Mr. James Vick, the well-known florist, and enthusiastic admirer of flowers, passing over one of these railroads across Kansas soon after its opening, was struck by its novel appearance, and thus wrote home about it: "This *Euphorbia marginata* is a very pretty annual, making a plant, in the newly disturbed soil, of nearly two feet in height, and having the appearance of a shrub or a miniature tree. The largest of the leaves are nearly two inches in length, growing smaller as they approach the tops of the branches. The leaves are of a very pretty light green, surrounded by a margin of clear snowy white, on the large leaves merely a line, becoming wider as the leaves get smaller, until the smallest are nearly or quite pure white, as are also the flower bracts. It grows abundantly, and is called by the people here 'Snow on the Mountain,' and we thought this a very appropriate name." The florist is not alone in paying tribute to its natural beauty; even the botanist often pauses to express his admiration of that element in this flower, though beauty has no recognized place in his systems of classifications. Thus Mr. Burgess, in the note already referred to, speaks of the dazzling splendor of certain plants growing over the "rarely carved Bluffs," among which he especially notes our plant as "struggling up the side, over the summit at last!" The "Botanical Gazette," in speaking of its existence at Madison, Indiana, says: "It seemed to make its appearance quite suddenly at Madison a few years ago, but is spreading with wonderful rapidity, covering only such hills and parts of hills as have been cleared of timber, and are covered with sand or gravel. It ranges over many acres of the hilly ground, and is creeping slowly to the level ground. Its milky juice is very abundant, and may some day yield in its gum, to investigating industry, an ample return for its cultivation. Those who have occasion, however, to handle it, had better not do so with abraded skin, and should be careful not to convey any

to the mouth, as the principle Euphorbin is exceedingly irritating in minute quantities, and may be fatal in large portions."

Since its introduction to our gardens its singular beauty has been recognized by florists, and it often enters into the artistic floral work known as "bedding," or the growing of plants in large masses with regard to their harmonies of color. It is quite likely that in time some varieties may be discovered which will give an increased floral interest to this beautiful plant. Even in nature some variations from the normal form are found at times, and a very striking one is referred to in Engelmann and Gray's account of Lindheimer's Texan collections. This one is described as having the broad white margin often more or less crisped. This variety they name *Euphorbia marginata* variety *uloleuca*, and if its peculiar crispy character could be developed it would be highly prized by florists.



ASPIDIUM FRAGRANS.

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ASPIDIUM FRAGRANS.

SWEET SHIELD-FERN.

NATURAL ORDER, FILICES.

ASPIDIUM FRAGRANS, Swartz.—Fronds four to twelve inches high, glandular and aromatic, narrowly lanceolate, with linear-oblong pinnately-parted pinnæ; their crowded divisions oblong, obtuse, toothed or nearly entire, nearly covered beneath with the very large, thin, imbricated indusia, which are orbicular with a narrow sinus, the margin sparingly glanduliferous and often ragged. (Gray's *Manual of the Botany of the Northern United States.* See also Wood's *Class-Book of Botany*, and Eaton's *Ferns of North America.*)

SOME families of plants are peculiar in their characters; and the genera and species have a certain general resemblance to each other, so that few can be mistaken in their relationship. Thus those who know little of botany as a science can usually tell a fern when they see it, and can understand by this what a botanist means when he speaks of any particular family of plants as being a very natural one.

From this particular sameness in the general aspects of ferns, one might suppose that little could be said of each species in detail. In common language one might imagine that a "fern was merely a fern, and nothing more;" but in truth beneath this general uniformity of dress lies a great variety of character, and the lessons we may derive from each species are almost as numerous as we might gather from the study of individual human beings. We are often told of the lessons we may learn from flowers; but the lessons from plants which have no proper flowers, as ferns have not, are no less inviting. In some respects they have advantages which flowering plants have not, for often a flowering plant possesses but little interest to the average botanist when it is not in bloom, while the fern is generally inter-

esting to him at all seasons, for a fertile plant will frequently furnish specimens "in fruit" during most of the summer season, and in some cases long after the wild woods have lost their autumn foliage, and present in the language of the poet Winter—

"Bare, ruined choirs where late the sweet birds sang,"

may the botanical inquirer find all he wants to know in the lingering fronds of some hardy fern.

Our present species, *Aspidium fragrans*, is particularly rich in lessons, both as to its historical relationships and in the many points which are essentially its own. Until comparatively recent times it was supposed to be wholly an Old World fern. It has been long known to European botanists, and was described by Linnæus now much over a century ago as *Polypodium fragrans*. It was first found in the United States by Dr. C. C. Parry, the botanist attached to Owen's Geological Survey of Wisconsin, Iowa and Minnesota in 1852. In the Report of this Survey, Dr. Parry says he found this fern on the Trap Rocks, near the Falls of St. Croix, and he remarks "the whole fern is beset with fragrant glandular hairs. It grows in dense tufts, in the shaded crevices of trap rocks, with the withered remains of several years' growth still adhering. The fronds are of a deep green color above, paler below, four to nine inches high. The aroma is permanent and agreeable. I am informed by Dr. Torrey that this species has never before been found within the limits of the United States, but has been obtained in British America and Kamschatka, where it is used for making tea. In the locality here specified, it is quite abundant." Since 1852 it has been found in many other parts of the Union bounding the Canadian territory, as for instance in Maine, Vermont, New Hampshire and New York. New locations are occasionally yet found for it, and the possibility of finding it where it has never been met with before gives zest to the plant collector who may be on botanical excursions through the Northern States. The natural situation where it may be found is well suggested in the extract from Dr.

Parry's report. One of the more recent discoverers, Mr. C. G. Pringle, who saw it growing on Mount Mansfield, Vermont, in a letter to the writer under date of April 13, 1879, gives so excellent a description of how the plant appears in its native home that we are tempted to quote it here: "In the several stations of *Aspidium fragrans* among the Green Mountains, which I have explored, the plant is always seen growing from the crevices or on the narrow shelves of dry cliffs—not often such cliffs as are exposed to the sunlight, unless it be on the summits of the mountains, but usually such cliffs as are shaded by firs, and notably such as overhang mountain rivulets and waterfalls. When I visit such places in summer, the niches occupied by the plants are quite dry. I think it would be fatal to the plant if much spray should fall on it during the season of its active growth. When you enter the shade and solitude of the haunts of this fern its presence is betrayed by its resinous odor: looking up the face of the cliff, usually mottled with lichens and moss, you see it often far above your reach hanging against the rock, masses of dead brown fronds, the accumulations of many years, preserved by the resinous principle which pervades them; for the fronds as they disport regularly about the elongating caudex, fall right and left precisely like a woman's hair. Above the tuft of drooping dead fronds which radiate from the centre of the plant, grow from six to twenty green fronds, which represent the growth of the season, those of the preceding year dying towards autumn." Its filical companions in this locality are *Cystopteris fragilis*, *Polypodium vulgare*, and *Woodsia Ilvensis*.

The observations of Dr. Parry and Mr. Pringle not only interest us in the pen-picture of the home of our sweet-scented shield-fern, but will be very useful to those who desire to cultivate it. It has been under culture in English gardens since 1820, and is still popular with the hardy fern growers there, notwithstanding the influx of new favorites. A writer on hardy cultivated ferns in the *Gardener's Chronicle* for February 8, 1879, says it is regarded there as "a charming little species, very sweet-

scented. Planted in a select position it will do very well indeed."

The tea made from the leaves is referred to by various authors as very agreeable, and Professor Eaton says some writers have compared the fragrance of the plant to that of raspberries.

Our space will not permit of an extended analysis of its more purely botanical points of interest. From *Polypodium fragrans* it was made *Aspidium fragrans* by Swartz in 1771; and this is generally followed by American authors, though it will be found as *Lastræa fragrans* in most English works. Various authors speak of it as *Nephrodium*, or *Polystichum*. It varies much in the forms and characters of its fronds, as indeed we must prepare ourselves to expect with most species of ferns. In specimens before us from Alaska collected by W. W. Harrington on Dall's exploring expedition of 1871 and 1872, the main rachis and those of the divisions of the frond are slender and hair-like, while Wisconsin specimens of Hale and Lapham have a very coarse and heavy look. Our illustration from a specimen growing under the care of Mr. Jackson Dawson, of the Arnold Arboretum, Mass., shows a fair average form.

EXPLANATIONS OF THE PLATE.—1. A plant divested of its old nest-like leaves. 2. A pinnule very much enlarged. 3. Portion of the under side of a pinnule, showing the remarkably scaly rachis. 4. A lobe very much enlarged, showing the indusium as well characterized in Dr. Gray's description, and also the resinous dots.

ERIGERON BELLIDIFOLIUM.

L. PRANG & COMPANY, BOSTON.

ERIGERON BELLIDIFOLIUM.

POOR ROBIN'S PLANTAIN.

NATURAL ORDER, COMPOSITÆ.

ERIGERON BELLIDIFOLIUM, Muhlenberg.—Rays crowded and rather conspicuous; purplish. Plant hoary-villous; stem simple and few-leaved; leaves spatulate and lance-oblong; heads large, few, corymbose; rays broadish. Perennial; stoloniferous. Stem nine to eighteen inches high. Radical leaves one to three inches long, spatulate and obovate, contracted to a margined petiole; stem leaves sub-serrate; the upper ones entire or denticulate, somewhat clasping. Heads of flowers two to three, or five (rarely seven or nine) in a loose terminal corymb,—the lower peduncles axillary, long and flaccid; rays pale bluish-purple; achenes smooth. (Darlington's *Flora Cestrica*. See also Gray's *Flora of the Northern United States*, Chapman's *Flora of the Southern United States*, and Wood's *Class-Book of Botany*.)

DR. DARLINGTON, from whose work we have taken our description, the drawings being made from a Pennsylvania plant growing near to where he wrote, gives "Flea-bane" as one of the common names of the genus, and so do most of our Botanical Text-books; while some authors speak of our plant as the "Daisy-leaved" and "Early-flowering" Flea-bane. The plant, however, has very little relation to the true Flea-bane; and in examining the reasons for the appellation, we learn a valuable lesson as to the making and perpetuation of errors, when the care to be strictly accurate which we endeavor to exercise in preparing "The Native Flowers and Ferns" is not taken. Green tells us that the name of Blue Flea-bane was unfortunately given to the *Erigeron acre* by "some English botanists, which thus tends to confound it with Conyza." And of *Conyza squamosa* the old herbalists say, "the juice of the whole plant cures the itch, by external application, and the very smell of the herb is said to destroy fleas." Both of these are European

plants. We see that the mere accident of some general appearance in the flower led some botanists into calling that species "Blue Flea-bane;" and our botanists, with far less excuse, left the "Blue" off, and gave the common name of the *Conyza*, Flea-bane, to the whole genus *Erigeron*. So far as the writer of this can learn, the name of "Flea-bane" was never used by the people of the United States for these plants until it was employed in botanical works, and very rarely if at all now, which renders the introduction of the misleading name into our literature the more unpardonable. Even the common name for this species, "Poor Robin's Plantain," has been modified by botanists in various ways. Sims, in the "Botanical Magazine," many years ago, figured it, and says: "It grows from North Carolina to Canada, where it is known as 'Poor Robin's Plantain.'" Dr. Gray, in "School Botany," cuts it down to "Robin's Plantain," Prof. Wood to "Robins' Plantain," and Dr. Darlington "Poor Robert's Plantain." The origin of the common name is not clear; but if ever the occasion should arise to make an investigation important, the student would probably be misled by these careless alterations in the orthography of the names.

The specific name, *bellidifolium*, was suggested by Dr. Muhlenberg in a letter to Willdenow, who adopted it in the description of the plant in his "Species Plantarum." It signifies having a leaf like the *Bellis perennis* or English daisy, though there is no very close resemblance. The best that can be said is that it is perhaps more nearly like the leaf of that popular English flower than the leaves of other species are. A peculiarity of the genus *Erigeron* is to have a large number of ray florets, and in this respect the whole family has a resemblance to the daisy, and our present species may carry the association closer to this great national favorite, because like it the earliest spring meets its opening flowers. It is the first of all the American *Erigerons* to bloom. We may say of it as Burns said to his "Mountain daisy:"

"Cold blew the bitter-biting north
Upon thy humble birth;
Yet cheerfully thou venturest forth
Amid the storm,
Scarce reared above the earth
Thy tender form."

The writer has gathered flowers of this daisy-like species among the snow in a late spring. The generic name, *Erigeron*, according to Milne, is "from *er*, the spring, and *geron*, the Greek name for *senecio;* that is, a senecio which flowers in spring." It may be observed that *geron* really means an old man, as its Latinized form *senecio* does—from *senex*, old,—and this is in allusion to the copious white pappus often in globose masses like a head of white silken hair. But *Erigerons* do not all bloom in spring. There is another species, *Erigeron Philadelphicum*, which is very closely allied to this, one of the chief differences being that while our present subject is often in bloom by the end of April, and is rarely found in blossom after June, the *E. Philadelphicum* does not commence to open its flowers till June, and often continues till August at least in Pennsylvania. The creeping runners or stolons (Fig. 3) also distinguish this species, the *E. Philadelphicum* always having a tufted root stock. While on this subject of botanical differences, it may be noted that in many genera of composite plants it is very easy to distinguish one from another by something in its aspect which is very hard to define in words. The practised collector can almost always tell an *Erigeron* when he meets with it for the first time, the very large number of ray florets being in a great measure a characteristic. Yet the botanist, when he comes to analyze the structure closely, finds it difficult to tell how to distinguish it from an *Aster*, a *Diplopappus* or some of the other neighboring genera. Some of the species, indeed, have a double pappus, as in the last-named genus, especially those which bloom in the fall season, about the time when *Diplopappus* is generally found, and in these cases the appendages of the style, shorter and blunter than in *Diplopappus*, form all beyond the "popular aspect" that is relied

on to distinguish it. There are numerous species in the United States, abounding chiefly in the higher regions, but the popular aspect referred to characterizes them all. Our species is one of the most frequently met with in the Eastern States.

It is not particularly confined to open meadows, though often found there.

> "But this bold floweret climbs the hill,
> Hides in the forest, haunts the glen,
> Plays on the margin of the rill,
> Peeps round the fox's den" —

as Montgomery says of its celebrated English ally. It is almost impossible for the average collector to make very extensive journeys in spring time without meeting it. Very often it forms thick patches many yards in extent, keeping down most other vegetation, by its creeping stems—and then its bluish-purple flowers give a peculiar feature to the spring vegetation even when seen from long distances.

Beyond its spring beauty—though that is no mean element of usefulness—the "Poor Robin's Plantain" has not made for itself much of a name in the service of man. Rafinesque, one of the most industrious authors in the early part of the present century, gives a special chapter to the medical virtues of the *E. Philadelphicum*, and seems to include our species, which he calls "the Daisy Flea-bane, a Vernal Vernil," amongst others, when he says: "They were known to the Northern Indians by the name of Cocash or Squaw-weed as menagogue and diuretics." As a styptic he thinks "they have saved many lives." It is extremely useful when applied to wounds and tumors.

EXPLANATIONS OF THE PLATE.—1. A plant from Pennsylvania taken in May. 2. Upper portion of flower stalk. 3. Runners which later in the season form new plants at their ends.

PINGUICULA LUTEA.

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PINGUICULA LUTEA.

YELLOW BUTTERWORT

NATURAL ORDER, LENTIBULARIACEÆ.

PINGUICULA LUTEA, Walter.—Leaves from ovate to oblong-ovate, an inch or two long; scapes five to twelve inches high; corolla an inch or less long; the lobes longer than the short-campanulate tube with the saccate base, all or the lower and lateral usually four-lobed or two-cleft with the divisions obcordate, or variously sinuate: spur subulate, as long as the sac and tube; palate oblong, very salient, densely bearded. (Gray's *Synoptical Flora of North America.* See also Wood's *Class-Book of Botany*, and Chapman's *Flora of the Southern United States.*)

IT is always interesting to know the origin of names, and their meaning; not so much because it is any great guide to the knowledge of the plant itself, as that it keeps us from error, and this is equal to knowledge. In connection with our present subject we may note that the long known species of Europe, *Pinguicula vulgaris*, among its numerous English names was known as the "Yorkshire Sanicle;" and, misguided by this name, a popular English medical work of the last century—the "*Botanalogia*" by Salmon—figures the *Sanicula Europæa* for the true "Butterwort" which is the old *Pinguicula.* It is possible that there may be a similar misconception as to the origin of the generic name *Pinguicula.* All our text-books tell us that it is from *pinguis*, Latin for fat, "the leaves being mostly greasy to the touch, whence the name." But there is nothing particularly greasy in the appearance or feel of the European Butterwort more than in other familiar plants to suggest to the common people any such special name for it.

The botanical name, *Pinguicula*, seems to have been first used by Conrad Gesner, of Zurich, in Switzerland, who published in

Basil, in 1541, a history of plants. It had long been known as "Butterwort" by the English, and it would be quite natural for the common name to suggest the botanical one, and "Pinguicula" would regularly follow. But "Butterwort" does not seem to have been derived from the greasy feel of the leaves, but from the power possessed by the plant of rapidly turning cream into butter. Linnæus observed that the soft white hair which covered the leaf secreted a glutinous fluid. These glutinous leaves were put by the inhabitants of northern Europe into a sieve, and then the fresh milk of the reindeer passed through, and in a day or so afterwards it became a firm buttery mass. This butter was a popular article of diet with the Swedes, and it is as fair a deduction that a plant which actually made butter, should thereby earn the name of "butterwort," or butterplant, as that it comes from the leaves having a greasy feel which might suggest any oily, greasy feel, as well as that derived from butter. Moreover, old Gerarde, one of the earliest writers on English gardening, calls the plant "Butter-root," which he would scarcely do, if the "butter" was simply in relation to the greasy feel of the leaves. As a rule, it would be just as well if names meant nothing; but when they are supposed to be connected with the history of the plant, it becomes important that the history should be scrupulously correct. It may be noted here that Gesner supposed the European *Pinguicula* was the plant referred to by Pliny as *Dodecatheon*, but this name was subsequently transferred by Linnæus to an American genus of plants having little relation to this.

Pinguicula has become a plant of more than usual interest since Mr. Darwin discovered that the acrid excretion of the leaves catches insects and in a manner digests them. Besides that, a considerable amount of motion is exercised by the leaves when catching insects. Mr. Darwin noticed that the glands secreted much more freely when excited by touch; and the leaves which had the glands the most sensitive in this respect were those which exhibited the most motion. The motion is, however,

very slow. It is simply the incurving of the leaf over the insects, seeds, or other objects caught; and occupied about fifteen hours under Mr. Darwin's observation. It thus appears that the motion has no direct relation to insect-catching, for they are caught and held long before by the viscid glands; but Mr. Darwin found that the greater the number of glands that could apply their secretions to the insects caught, the more rapidly did digestion go on, and this motion, therefore, appears rather as an aid in nutrition than as a mere insect-catching power as in some plants. Mr. Darwin closes a lengthy but highly interesting paper on his experiences with the common *Pinguicula* by remarking, "we may therefore conclude that with its small roots it is not only supported to a large extent by the extraordinary number of insects which it habitually captures, but likewise draws some nourishment from the pollen, leaves, and seeds of other plants, which often adhere to its leaves. It is therefore partly a vegetable as well as an animal feeder." It is well worth while to inform ourselves of these wonderful discoveries of Mr. Darwin in connection with the old world plants, because it is more than likely that some highly interesting observations may be made on other species, of which there are some half a dozen natives of the United States, and especially on the one we have now before us, the "Yellow Butterwort." Its leaves are also clammy-pubescent; and, as will be seen by our plate, it has the remarkably disproportionate roots to leaves so specially noted by Mr. Darwin as a reason why the leaves should aid in the direct nutrition of the plant. In this way it may yet make a history for itself, towards which, so far, it has done little. All that it has yet contributed is the fact, that it is one of the pretty spring-flowers which give such a charm to the early season of the southern United States. Mr. A. P. Garber tells us in a sketch of early southern flowers, in the first volume of the "Botanical Gazette," that it was one of the first that greeted him on landing at Palatka, Florida, on the 16th of February; and Mrs. Mary Treat, to whom, through Professor Sar-

gent, of Cambridge, Mass., we are indebted for the specimen from which our drawing was made, reports that it is one of the most beautiful of the early floral attractions of that State. Other observers from further northward report that it often grows in immense patches in rather sandy places, especially in the Pine barrens, where, in March, it forms brilliant golden sheets of bloom. Its favorite situation seems to be in locations rather damp than dry.

To botanists it is an old acquaintance, having been noted by Walter, who published a "Flora of Carolina," in 1788. Lamarck, in 1792, named it *Pinguicula campanulata*, but the prior name of Walter's, under botanical rules, is the accepted one. Beyond this it has no synonyms of importance, though Professor Gray notes that it probably has some varieties.

The natural order to which it belongs, *Lentibulariaceæ*, is a very small one, containing scarcely half a dozen genera, of which *Utricularia* and our present genus constitute the most important representatives. The name *Lentibulariaceæ* is derived from what was once the genus *Lentibularia*, but which has since been absorbed by *Utricularia*, the well-known and curious "Bladderwort."

Our artist has presented the flowers in so many aspects that a detailed explanation is scarcely necessary. Fig. 2 shows the two-lipped character of the calyx when divested of the corolla, but this also appears from the back view of one of the expanded flowers.

ANEMONE VIRGINICA.

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ANEMONE VIRGINIANA.

TALL ANEMONE.—THIMBLE-WEED.

NATURAL ORDER, RANUNCULACEÆ.

ANEMONE VIRGINIANA, L.—Hairy; principal involucre three-leaved, the leaves long-petioled, three-parted; their divisions ovate-lanceolate, pointed, cut-serrate, the lateral two-parted, the middle three-cleft; peduncles elongated, the earliest naked, the others with a two-leaved involucel at the middle; sepals five, acute, greenish, in one variety white and obtuse; head of fruit oval or oblong. (Gray's *Manual of the Botany of the Northern United States.* See also Chapman's *Flora of the Southern United States*, and Wood's *Class-Book of Botany.*)

IT is scarcely possible to have an *Anemone* brought to our notice, but the many poetical and other pleasant associations which have been connected with it through so many ages crowd themselves on our attention. A large volume might be devoted wholly to the polite history of the *Anemone.* All we can do in a few pages like ours is to refer to some of the most prominent circumstances that have been connected with the family. Few would believe that any of the pretty species which form the genus, and which have had so many pleasant stories founded on their innocent-looking little flowers, ever were in ill-favor with mankind; and yet the ancient inhabitants of Eastern Europe believed that the wind was poisoned by passing over a field of *Anemones*, and that severe maladies followed those who had to breathe in this poisoned atmosphere; and this belief exists among the common people of those lands even down to our time. For this reason the Persians have taken an *Anemone* to be the emblem of sickness, yet few of those who write of the "language of flowers" know how the association originated. The Romans appear to have had some such an idea, but believed

they had the power to propitiate the evil spirit ruling the *Anemone*. Hence, the first Anemones of the year were eagerly looked for, and were gathered with spell-words and ceremonies, and after such propitiations the flower was supposed to be a special safeguard against malarious diseases and pestilences.

However, almost, if not all, that appears in either ancient or modern history of the *Anemone*, refers to some early spring flowering kind; while the one we now have before us is rather the child of summer, for it commences to bloom in June, and continues till August.

An anonymous poet tells us that,

> "Thickly strewn in woodland bowers,
> Anemones their Stars unfold."

But again, in situation as in blooming time, this does not refer to our present species, for it does not bloom in shaded places, but along fences and the borders of woods where it can receive the protection of some dry leaves for its roots during the winter season, and yet have the advantage of the full sunlight for its leaves and flowers. To those who admire floral nature, it seldom appears as a very remarkable element in the beauty of the scene, for it lacks the gay colors which usually attract us. Indeed it seems little more than an ordinary coarse weed. Yet few go out to collect wild flowers in the places where this may be found without having it among their trophies, and this alone shows that there is something about it worthy of thought, if not of admiration. And there is, indeed; for some very valuable botanical lessons may be derived from it.

In many Anemones the leaves on the stems have been so altered, that they scarcely look like leaves. In some instances they are drawn so close to the flower that, in their altered condition, they appear like parts of the inflorescence and are regarded as involucres, which may be considered a part of the floral envelope, a grade lower than a calyx. So much changed from true leaves have been the involucres of many of the

European forms, that disquisitions on their real nature have been made by distinguished botanists. In the "Journal of the Proceedings of the Linnæan Society, of London," for 1860, Mr. George Bentham suggests that the involucre of Anemone was, originally, but a single leaf clasping the stem; and Professor Asa Gray takes occasion in "Silliman's Journal," of May, in that year, to show from the well-developed involucral leaves of *Anemone Virginiana*, here illustrated, what their real nature is.

But we may pursue our studies further in the same direction. We may learn from our present species, how closely related all the parts of a plant are, and see very easily how one part is transformed from another part. We must imagine first that our plant may have had a branching character to a much greater extent than it possesses now. The five petals may have been leaves just as fully developed as the three "involucral" leaves in our plate but for a greater arresting power of development at that point, in which case the central portion, now stamens and pistils, would have been extended to another flower-stem, and there would have been five axillary buds at the base of each of these five involucral leaves. Just this process has occurred as we can trace in the picture; except there were but three axillary buds there, and but three leaves. In the arrestation of the central stem, the three axillary buds were not transformed, but made an attempt to develop into branches, only again to be arrested by the reproductive force. In this case the whole growth is weakened, and we see was not powerful enough to take more than two nodes into its rhythmic grasp, making but two involucral leaves,—and these again so weak that no further axial buds could be developed. We gather, therefore, that very slight variations of the rhythmic force connected with the laws of acceleration and retardation make all the differences in structure; and we can understand how very easily one form or species may be evolved from another one. Indeed, we often meet with variations in the normal growth of our present species which want nothing but permanence to be regarded good

specific characters. On one occasion, the writer found a specimen in which the central flower was stalkless, or sessile. In this case it had but three petals, and these were protruded between the three flower-stalks growing from the flower's base, and which, as we have already seen, are transformed branches from three axillary buds. By this lesson we can comprehend why the middle stalk has no leaves, or involucels, as the three laterals have. If it were to have them, they would have to be formed of the five leaves now used to make the sepals.

Lesquereaux tells us that in Arkansas the species is known as "Tall Anemone," and this indeed is a very characteristic name; the plant growing in many cases from two to three feet high. Darby says in his "Botany of the Southern States," that in that section of the country it is known as "Thimble-weed," the name obviously derived from its almost mature head, which, in many cases, has a very thimble-like appearance both in form and marking.

It is found somewhat frequently in most of the eastern part of our territory, from Canada to South Carolina, being, however, most at home in the northern latitudes, where it has travelled completely across the continent. The color as usually seen is greenish; but forms have been found with pure white flowers, and a judicious selection might reward the florist with showy improvements.

EXPLANATIONS OF THE PLATE.—1. Upper portion of a flower-stalk, made from a Pennsylvania specimen in July. 2. The central branch arrested to form a flower-stalk with its naked peduncle. 3. Axillary branches, finally bearing each a weaker flower-stalk. 4. Axillary leaves, transformed to involucre and involucel. 5. Longitudinal section showing the receptacle, with carpels attached.

CHEILANTHES VESTITA.

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CHEILANTHES VESTITA.

HAIRY LIP-FERN.

NATURAL ORDER, FILICES.

CHEILANTHES VESTITA, Swartz.—Fronds broadly lanceolate, like the stalks hirsute with rusty hairs, bipinnate; pinnæ triangular-ovate; pinnules oblong, obtuse, more or less incised; the ends of the lobes reflexed to form separate herbaceous involucres. Fronds four to eight inches long, becoming smooth above. (Chapman's *Flora of the Southern United States*. See also Wood's *Class-Book of Botany*, Gray's *Flora of the Northern United States*, Eaton's *Ferns of North America*, and Williamson's *Ferns of Kentucky*.)

FERNS have no small part of the world allotted to them. Though but a fraction of the vegetable kingdom, they share every portion of it with flowering plants. There is no spot, however rocky and dry, but some ferns may be found as well as where the soil is deep, and in damp or marshy places. In altitudes high up among the clouds ferns exist, as well as in low situations near the level of the sea. In the arctics and in the tropics—there is scarcely a spot on the habitable globe wherein the lover of plants may not expect to find a fern. The greater part of the Ferns of the Eastern United States love the shade of woods, or to be in rich or damp meadows; and those that live on rocks are usually found where there is shade above them, or cool moisture about the roots. But our present species, *Cheilanthes vestita*—the Hairy Lip-Fern—is one which grows in the clefts of dry rocks, sometimes in exposed sunny places, where often in the summer season it dries and curls up, and appears as if dead. In this condition it has been found by the writer on rocks along the Schuylkill river, and in Southern Illinois.

Most species of fern are admired for their thin, filmy fronds;

and delicate, graceful habit. This one has little of such characteristics to commend it. Though the fronds are cut and numerously divided, there is a stiffness and heaviness about the plant unusual in so many of its ferny neighbors. This is increased by the heavy, coarse hair covering the fronds, and from which its specific name *vestita* has been derived. There is also an additional heaviness in the appearance from the great number of rather large spores, which often almost cover the back of the fertile frond. Again, the curving back of the margin of the lobes of the frond, from the manner of which the generic name is derived, makes the fronds look unusually thick for a graceful fern. Still it is a species which is very much admired by fern-lovers; and fern-culturists make very pretty specimens of it, when the best conditions for its growth are understood.

This turning back of the edges of the leaves or fronds is one of the peculiarities of the genus. In the time of Linnæus it would have been regarded as a *Pteris*, which also has the edges of the fronds recurved; and indeed the genus founded by Swartz was established on a species from the Cape of Good Hope, previously known as a *Pteris*. The date of this establishment is fixed by the pteridologists as 1806; but the species here illustrated had been discovered by Michaux three years before, and was referred by him to *Nephrodium*, a genus established by Richard, a French botanist, a few years before, and it is described in his works as *Nephrodium lanosum*. When found to be more properly belonging to the new genus *Cheilanthes*, it was removed to that genus, and named *Cheilanthes vestita*. Some botanists have thought that as Michaux first described it, his specific name might at least have been preserved when it was taken to *Cheilanthes*, and they call it *C. lanosa;* but Professor Eaton, in his "Ferns of North America," properly shows that though it is sometimes desirable to carry on these names where changes are made, it is not obligatory on the botanist to do so, and therefore we must abide by Swartz's name, *Cheilanthes vestita*, though Michaux and not he was the original describer of the plant; and

we thus have an illustration of a rule in botanical nomenclature, that when a botanist discovers that a plant belongs to a different genus from the one in which it has been placed, and has the right to make a new name for it if it be a new genus, the adjective or specific name belongs of right to him also.

For a long time the Hairy Lip-fern was the only known species of our country, but of late years several others have been discovered, both in the eastern and western portions of the United States.

This fern is very variable in its growth in different locations, and the collector may often be inclined to look on his collections as new species. In Mr. Williamson's "Ferns of Kentucky" is a cut of the prevailing form in that State which shows a much more elongated and narrower frond than ours. On the Pacific coast some are found with a close relation to ours, but Professor Eaton decides these to be specifically distinct. In the sixth volume of the "Bulletin of the Torrey Botanical Club" he shows particularly how the *C. Cooperæ* of California differs from our present species in the hairs being tipped with a glandular enlargement. It would be well for those who may have the opportunity of noticing the species described here to observe whether among the variations to which it is known to be subjected there is in any localities a tendency towards this peculiarity. Mr. Williamson in his "Ferns of Kentucky" notes that the hairs in our species are flattened as seen under a microscope, a form of hair not often found in plants.

As already stated, Ferns have a wide geographical range, some extending to the extreme north, and others favoring the tropics; but distinct classes incline to have their own separate centres, and in this relation the species of the genus *Cheilanthes* seem to be departures from a southern rather than a northern home. The Hairy Lip-fern, now illustrated, is the most northern of all that grow along the Atlantic sea-board states. Professor Gray says in his "Manual," that it is found in the clefts of rocks on New York island, where it was found by Mr. W.

Denslow, and from thence through New Jersey to Illinois and southwards; and Professor Eaton in his "Ferns of North America" adds to this "Missouri and Kansas, and southward to Carolina and Georgia." Of special locations Professor Eaton quotes Hackensack Swamp, New Jersey, discovered by Mr. F. J. Bumstead, in 1865. Dr. Chapman, on the authority of Professor Kunze, of Leipsic, gives near Augusta, Georgia; and Dr. Kunze himself, as quoted in volume 6 of "Silliman's Journal," new series, says, "it is evidently common in the southern states." Dr. Engelmann, in the same volume, remarks that he "had collected it on the calcareous rocks about the Hot Springs of Arkansas;" and Dr. Darlington says in "Flora Cestrica," that it is very common on rocks in Chester county, Pa. In Kentucky, Mr. Williamson says, it is rather rare, and gives Sweet Lick Knob, near Irvine, found by Dr. Crozier; and near the boundary between Edmonson and Barren counties, near the Diamond Cave, by Professor Hussey, as special locations.

Professor Eaton furnishes several synonyms under which it has been known, but, except perhaps *Adiantum vestitum* of Sprengel, there are none beyond those already noted likely to be met with by our readers.

EXPLANATIONS OF THE PLATE.—1. A full-sized plant from a living specimen, furnished by Mr. Jackson Dawson. 2. Enlarged views of portions of the frond, showing the recurved lip-like margin.

IRIS MISSOURIENSIS.

IRIS MISSOURIENSIS.

ROCKY MOUNTAIN IRIS.

NATURAL ORDER, IRIDACEÆ.

IRIS MISSOURIENSIS, Nuttall.—Flowers beardless; stalk terete, taller than the leaves, sub three-flowered; leaves narrow, sword shaped; capsule oblong-linear; flowers two-colored. Stem twelve to sixteen inches high, erect, filled with pith, producing about three flowers, of which the large reflected petals are yellow, and the inner petals blue and narrow. Germ oblong-linear. (Nuttall in an account of the plants collected by Captain Wyeth. *Journal of the Academy of Natural Sciences of Philadelphia*, Vol. VII., p. 38, 1841. See also Sereno Watson's *Botany of Clarence King's Expedition* as *Iris Tolmieana*, and Porter's *Flora of Colorado* as *Iris tenax?*)

HOUGH we aim to make our work one for the whole people as well as for the botanist, and it might therefore seem that all that is known of a plant's popular as well as of its scientific history should be included, it is not possible to do more than make selections, or give brief notes, except in cases where there may be many species of a genus, when from time to time we might hope to furnish enough to make every branch of a plant's history tolerably complete. In regard to *Iris* we have already given short sketches of its popular history, and have related that the ancients gave its fabulous origin to Juno, in honor of Iris, one of her waiting-maids. We may here quote the account of this as set forth by a French writer of several hundred years ago, Louis L. D'Auxerre, and translated into English in 1706:

"We are at a loss to know where *Iris* first had a being; some say at Florence; others in Greece; some in England; and others again fix her Nativity elsewhere; but it is known that she was the Daughter of *Thaumantias* and *Electra;* and, inasmuch as these Deities travell'd much, the Place of her Nativity was

not certainly known. *Iris* was a true Copy of her Original; she was handsome, and had a noble Air; and somewhat else in her Carriage that spoke her Divine Original.

"According to the good Custom of the Parents who seek nothing but the Advantage of their children, *Thaumantias* and *Electra* made it their whole care to advance their Daughter and procure her a Station worthy of her birth; and at last, managed the Matter so well, that Juno took her for her First Maid of Honour.

"*Iris* indeed had but odd Cards to play, having to live in the one House with Jupiter, who, as all the World knows, was a God of an Unholy Character. But after all *Iris* lived there, and remained a Model of every Virtue; for she being sprung of such Blood as hated every Species of Dishonor, carry'd herself so steadily, that even the Sovereign of the Gods respected her.

"Juno, prepossess'd with an opinion of the Girl's Discretion, bestowed upon her, besides the place she had, the Office of receiving the Souls of dying Women, and conveying them to their appointed Stations; but this was not the only Favour she showed to *Iris;* for, after that *Iris* had served her a little while, she resolved that she should not only appear in Heaven, but that a *flower* should grow upon the Earth that should bear her Name, and be deck'd in imitation of her, with divers Colours.

"In pursuance of this Resolution, the Goddess took a certain *Liquor*, in which *Iris* blowed three times; then shaking it again and again in a little Vessel, she gave it to her Waiting-Maid, who, after applying it for a Moment to her Mouth, pour'd it upon the Earth, where, as soon as it fell, up started a *Flower*, that has ever since gone by the Name of *Iris*."

Most *Irises* of the United States are found at low elevations and in damp situations; some few at elevations of one or two thousand feet; but the present species, *Iris Missouriensis*, grows in places high above the level of the sea and in districts where rain seldom falls. The following, from Longfellow's "Evangeline," exactly describes the location wherein our plant is found—

"Far in the West there lies a desert land, where the mountains
Lift, through perpetual snows, their lofty and luminous summits.
Down from their jagged, deep ravines, where the gorge, like a gateway,
Opens a passage rude to the wheels of the emigrant's wagon,
Westward the Oregon flows and the Walleway and Owyhee
Eastward, with devious course, among the Wind-river Mountains,
Through the Sweet-water Valley precipitate leaps the Nebraska;
And to the South, from Fontaine-qui-bouille and the Spanish Sierras,
Fretted with sands and rocks, and swept by the wind of the desert."

As it is the only species of *Iris* found there, the common name of "Rocky Mountain Iris" has suggested itself to us. It was first discovered by Captain Wyeth on the return from his celebrated expedition to the Pacific coast which left St. Louis in March, 1834. Mr. Nuttall says Captain Wyeth found it "near the sources of the Missouri on July 9th," and the specimen which he gathered, and from which Nuttall made his description, is preserved in the Herbarium of the Academy of Natural Sciences of Philadelphia. The plant, from which our drawing was made, was raised from seed gathered by the writer of this, in 1871, from nearly the same location on a level dry plain at an elevation of about 8,000 feet above the level of the sea. Professor Porter notes that it has also been collected in Colorado by Dr. Smith, Brandegee, and Hall and Harbour, and again the writer collected it in the Veta Pass in Southern Colorado, in 1878, so that it may be looked for by those collecting in various parts of this interesting region. The knowledge of Nuttall's plant was limited, and hence the specimens, found by other collectors from this point west to Oregon, were not properly identified with it, and the species has been re-named by other authors. Herbert, in the "Botany of Beechey's Voyage," describes it as *I. Tolmieana*, and as such it is referred to in Watson's "Botany of King's Expedition." Mr. Watson, after examining the specimens in the Philadelphia Academy, decides this to be the same as Nuttall's original species. This discovery gives our Rocky Mountain plant a wider geographical range. As *I. Tolmieana* Mr. Watson records it "on the Willamette, Oregon; Northern California; Ruby Valley, Nevada. Rather frequent on the Pah-Ute to the East Humboldt Mountains, Nevada, 6,000 feet altitude."

While sending our specimens to Mr. Watson, the drawing was also forwarded, of which he kindly says: "The leaves should be narrower (they are usually two to three lines broad—rarely more) and a paler glaucous green. It should show a pair of closely approximate bracts, acuminate, and differing from those of our other allied species in being thin, pale and scariously margined, becoming wholly scarious. The petals (standards as Baker calls them) should be erect to the tips or nearly so. The flower of *Iris* is a very difficult thing to figure if you wish to give more than a general idea of it, and very few of them in the books are really satisfactory botanically. This of yours is on the whole as good as could be expected, with the one exception noted."

Our plant had but the one scape, and the endeavor to give the manner in which the second bud pushes from one side of the bracts prevented the showing of the double character. But to correct the deficiency noted by Mr. Watson, we have since added from a dried scape (Fig. 5), showing the two bracts referred to at B. In regard to the width of the leaves and tint, we may say that they are faithful representations of nature at the time the drawing was made; but the root-stock as seen in our picture is very strong and vigorous. No leaves are wider than those represented, most are longer and slenderer, as suggested by Mr. Watson. As seen in our plate, the flowers appear sessile; but as they mature, as the writer has seen them in their native places of growth, only one fruit seems to come to perfection, and that one is on a pedicel of perhaps two inches long.

EXPLANATIONS OF THE PLATE.—1. Root-stock of last year. 2. Terminal growth of root-stock of preceding year. 3. Sub-terminal bud of last year, bearing the flower of the present season. 4. Scape, showing the bursting of the second flower from the bracts. 5. The scape at maturity not having perfected seed, but showing at B the two distinct bracts.

SOLIDAGO ULMIFOLIA.

L. PRANG & COMPANY, BOSTON.

SOLIDAGO ULMIFOLIA.

ELM-LEAVED GOLDEN-ROD.

NATURAL ORDER, COMPOSITÆ.

SOLIDAGO ULMIFOLIA, Muhlenberg.—Stem smooth, the branches hairy; leaves thin, elliptical-ovate or oblong-lanceolate, pointed, tapering to the base, loosely veined, beset with soft hairs beneath; racemes panicled, recurved-spreading; scales of the involucre lanceolate-oblong; rays about four. (Gray's *Manual of the Botany of the Northern United States.* See also Chapman's *Flora of the Southern United States*, and Wood's *Class-Book of Botany.*)

NO work professing to give a general view of the native flowers of the United States would do justice to its professions unless it had something to say of the Golden-rods, for they are among the most distinguished of American flowers. Everybody who knows anything of our wild scenery knows the Golden-rod; and no picture or description of an American autumn landscape would be complete without the Golden-rod as an essential part thereof. Our polite literature is full of allusions to this flower: the best remembered being perhaps that by Bryant in his "Death of the Flowers"—

> "The Wind flower and the Violet, they perished long ago,
> And the Briar rose and the Orchis died amid the summer glow;
> But on the hill the Golden-rod, and the Aster in the wood,
> And the yellow Sun-flower by the brook in autumn beauty stood,
> Till fell the frost from the clear cold heaven, as falls the plague on men,
> And the brightness of their smile was gone, from upland, glade and glen."

Our country is famous for the fading tints of its autumn foliage; but the rich yellow flowers of the Golden-rod mixing with the falling leaves do much towards the reputation for unsurpassed beauty which American autumn scenery enjoys. There are nearly fifty different species in the genus, and with one or

two yellowish-white exceptions are all of them yellow; but they vary very much in habit and in the arrangement of the flowers, so that though the Golden-rods are everywhere in our autumn fields and forests, there seems to be an unending variation in the effect they produce; and the impression to the novice in their study is that there are even a greater number of species among them than is actually the case.

Though so numerous in America, they are represented also in Europe, but only by a single species—the *Solidago Virga-aurea*—long known to the people of the Old World as the "Golden-rod," a name which has come with the emigrant to the New World, and has thus been given to the whole family, though few of them have that virgate or rod-like character which suggested the name for the original species. An old herbalist tells us "it is called in *Latin Virga aurea*, because the Stalks, being reddish, make the bushy tips of the Flowers seem as if they were of a Gold-yellow, and in *English* it is called *Golden-rod*." It is however interesting to note that though there is only one species indigenous to Europe, that one species, *Solidago Virga-aurea*, is also a true native of the northern regions of our own continent. Another interesting fact in their geographical relationship is that notwithstanding their great number—nearly half a hundred species—in the Atlantic portion of the United States, they almost disappear as they approach the Pacific Ocean, only seven species being described in Brewer and Watson's "Botany of California."

To show how rapidly our knowledge of the Golden-rods progressed, it may noted that in a copy of Gronovius' "Flora Virginica" before us, issued in 1762, there are but three species described. Muhlenberg in his catalogue (1813) enumerates forty-three, and for the whole of North America, Nuttall notes but forty-nine in 1818; while now before us is a copy of Wood's "Class-Book," in which are described forty-eight east of the Mississippi alone. Some of these indeed may be regarded in time as mere varieties of others, for in these days, as our know-

ledge of variation increases, the tendency of the best botanists is to unite forms rather than to name new species for every little shade of difference. The herbalist, to whom we have already referred, gives a figure of what he calls the "Golden-rod with dented leaves," and then refers to the "American Golden-rod," of which he says: "This Plant is so like to the other, that the Figure of that may very well serve for this without any considerable Error;" and though this expression may excite a smile from the accurate botanist of the present day, it must be confessed that the tendency in the past was too much in the way of making distinct species, or at least of giving distinct names to every slight deviation from an assumed typical form. Even of our present species, *Solidago ulmifolia*, Dr. Gray says in the "Manual," "too near *Solidago altissima;* distinguished only by its smooth stem and the larger leaves."

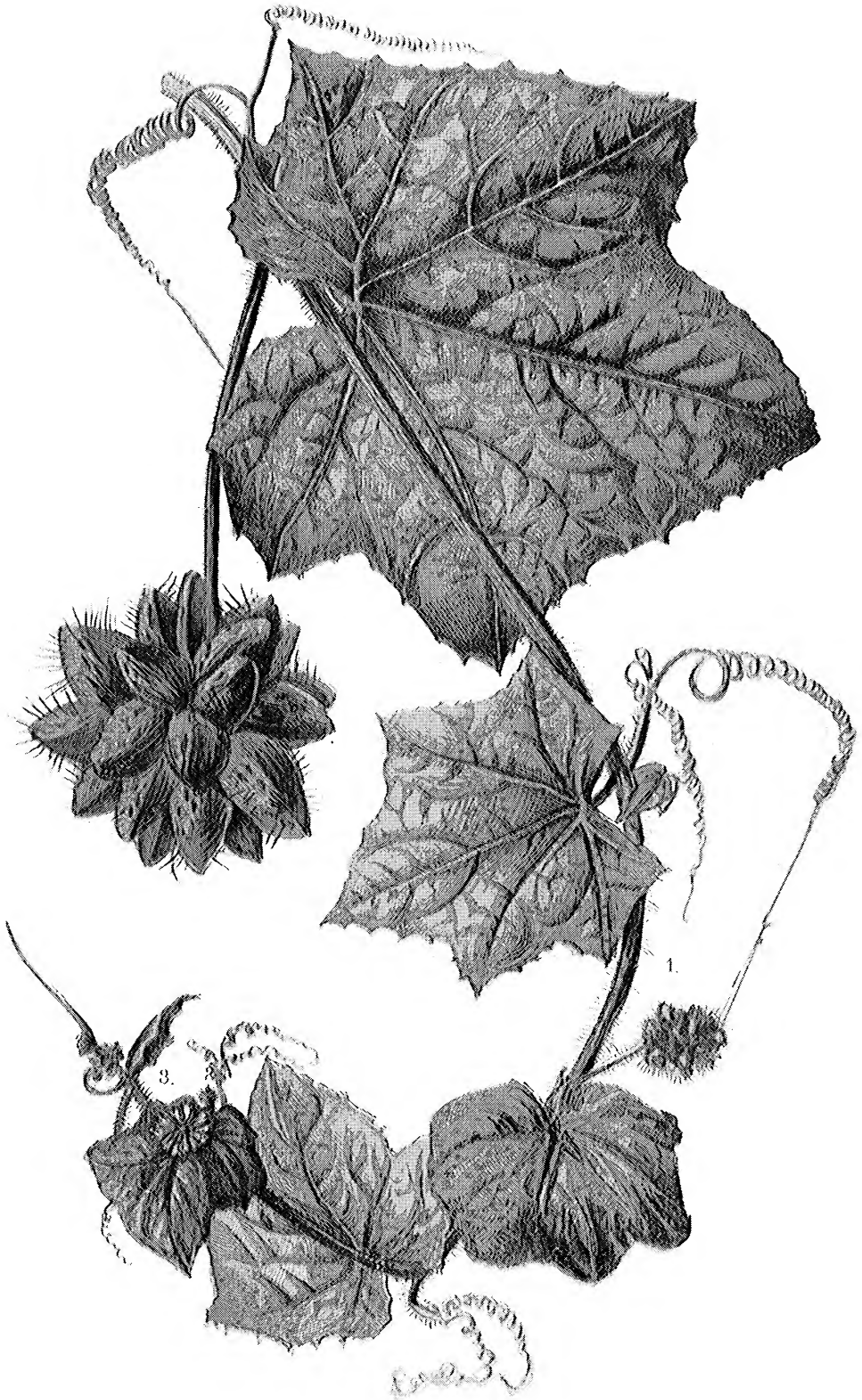
It may be here noted that the name *ulmifolia*, meaning having leaves like an *Ulmus* or Elm, is calculated to mislead, for the leaf has no great resemblance to that of an Elm. Willdenow, under botanical rules which call for a description and name, should properly be credited with this one, as he first published a description of it, though he gives credit to Muhlenberg as having sent him the name. It appears however that Muhlenberg sent out to others a different species under this designation, and it is probable, from the unlikeness of this to an Elm, that it was not the one originally intended to bear the name; but as names are intended to be "only names," this is now of little consequence, except as a matter of history.

The name of the genus *Solidago* is usually referred to Linnæus, though he credits it to Vaillant, one of the great botanists of the generation which immediately preceded his. It is said to have been derived from *solidus*, a Latin word meaning making whole or solid, and to be given to the "virga-aurea," from its medical reputation. Salmon, the herbalist of the beginning of the seventeenth century, says: "It is one of the most noble Wound-Herbs; cures Wounds and Ulcers." It also appears to have

been quite famous as a dye. Another of the old herbalists, Culpeper, says: "Venus rules this herb. It is a balsamic vulnerary herb, long famous against inward hurts and bruises. No preparation is better than a tea of this herb for this service; and the young leaves, green or dry, have the most Virtue." Linnæus admits it into his "Materia Medica" as a vulnerary and diuretic. It is among the most remarkable of medical facts, that a plant, which was once so famous as to elicit such strong commendation, and to have a name given to it in connection with this reputation, should now be wholly discarded from medical practice.

Our species, *S. ulmifolia*, has little to call especial attention to beyond what it might share with other species of the genus. It is one of the most common kinds in Eastern Pennsylvania where the plant illustrated grew. Its most striking characteristic is perhaps its large, open, branching stalks. Most of the familiar species of this region have their flowers in dense heads terminating the main flower stem; but this one begins to throw out slender branchlets, such as the one illustrated, low down on the stem; and there are many scores of these twiggy dividing branchlets in the make-up of the complete flower stalk. One of these main stems, often two feet high, covered with expanded flowers, is very showy indeed. It loves to grow in half-shaded woods, or in rather low, open places. In such situations it is often met with in most of the States from Alabama northwards.

EXPLANATION OF THE PLATE.—1. Upper portion of a main flowering stem. 2. Lower portion of the same. 3. Enlarged disk floret. 4. A small branchlet.



SICYOS ANGULATUS.

L. PRANG & COMPANY, BOSTON.

SICYOS ANGULATUS.

STAR-CUCUMBER.

NATURAL ORDER, CUCURBITACEÆ.

SICYOS ANGULATUS, Linnæus.—Stem branching, hairy; leaves roundish, cordate, with an obtuse sinus, five-angled or five-lobed, lobes acuminate, denticulate, female flower much smaller than the male. A weak climbing vine, with long, spiral, branching tendrils. Leaves three to four inches broad, alternate, on long stalks. Flowers whitish, marked with green lines, the barren in long pedunculate racemes. Fruit six lines long, ovate, spinous, eight to ten together in a crowded cluster, each with one large seed. (Wood's *Class-Book of Botany*. See also Gray's *Manual of the Botany of the Northern United States* and Chapman's *Flora of the Southern United States*.)

THE true artist has a great regard for nature when she pays her respects to him attired in gayly colored raiment, and when we handed this plainly dressed individual to Mr. Lunzer, a shade of disappointment clouded his brow. It seemed as if he would like to say, "What can I make of a uniform tint of green?" But we shall be much mistaken if most of those who examine our plate do not pronounce it one of the most beautiful pictures any of our wild flowers have so far afforded us. It is, indeed, extremely rare that so many elements of beauty are combined in one subject, and especially when the great advantage of brilliant colors is wholly wanting. A considerable amount of strength is expressed in the leaves and in the stems, yet the stem is not so very strong but its gentle curve as it narrows towards the apex harmonizes with elegance. The lower portion of the stem is straight, and this is in excellent harmony with the straight peduncle, straight mid-veins and angles of the leaves; and yet these alone would have a very stiff appearance but for the timely relief afforded by the

slight rounding of the base of the leaf-blade, and the general circular outline formed by the mass of little "pepos," as some authors call the fruits of some of these *Cucurbitaceous* plants. As the branch departs from its heaviness with its growth, and presents a pleasing curve, its elegance is increased by the slender tendrils gracefully twisting, and gently decreasing the diameter of their spiral coils till they terminate in a fine silk-like thread. Indeed, for a gradual blending of straight lines with curves, of heaviness with lightness, and of strength with elegance, this illustration of the "star-cucumber" can scarcely be surpassed, and will afford an interesting lesson to those to whom beauty is a science.

Then there are a few points worth noting by those who are interested in the literary history of plants. Our subject seems to have been known to some of the earlier botanists, and Tournefort, the predecessor of Linnæus in the work of botanical reform, placed it in the genus *Sicoyoides*—meaning, like the cucumber—sicyos (or sycios, according to Nuttall and others) being "cucumber" to the ancient Greeks. Linnæus established a rule that no adjective terminations should be allowed in generic names, and hence the last part was cut off, leaving *Sicyos* only. The explanation may be of service, as when the student is simply told that the name "is the ancient name of the cucumber," he would be led to wonder what relation our plant bore to the cucumber of the olden time. Tournefort, in naming it *Sicoyoides*, had doubtless nothing more in his mind than the great resemblance which the leaves, stems, and tendrils bore to the common cucumber, a resemblance which is certainly very close. It is not quite clear what was the real cucumber of the ancients. The "lodge, in a garden of cucumbers," of Isaiah and other scriptural references, are believed to relate rather to some kind of melon than to our modern cucumber.

Passing from the foliage to the fruit we find very little here to remind us of its common family name. Instead of a large number of seeds in a succulent capsule, each little flower results in a single

seed, surrounded, finally, by a thin, dry covering. Each of the little "cucumbers" we see in our cluster is indeed nearly all seed. It is from the somewhat stellate appearance of this cluster of seed vessels that the common name of star-cucumber is derived. It is sometimes called "single-seeded cucumber," for reasons already made obvious. Aiton says it is commonly called "Cho-cho vine;" but this is probably an error, the name belonging to the *Sechium edule*, a plant of the same natural order growing in the West Indies.

One of the most remarkable incidents in the life of the star-cucumber is its amazing growth under favorable circumstances. Dr. John M. Coulter, at page 72 of first volume of the "Botanical Gazette," speaking of the Lower Wabash, in Indiana, says: "These low rich bottoms have yielded such monsters in growth, especially among the climbers, that one is reminded of a South American jungle," and among these climbers refers especially to the "single-seeded cucumber, *Sicyos angulatus*, matting all bushes and vegetation within ten feet of its root into a thicket, or climbing up a neighboring tree to the distance of sixty-three feet."

Dr. Darlington, in his "Flora Cestrica," notes that "this cucumber-like vine has found its way into some gardens, where it is something of a nuisance, and rather difficult to be got rid of," though the amiable old botanist did not seem to have a heart to include it among the farm evils in his "Agricultural Botany." But Dr. Michener, in his "Manual of Weeds," has less tenderness for the beautiful vine. He says it is "an unwelcome vagrant from the gardens, which requires to be closely watched, wherever it may occur." The writer of this has often watched it, but not as an "unwelcome vagrant," or as a vagrant in any case. It loves to grow about old wood-piles, or in any place where there is an abundance of decaying vegetable matter; and it often does loving service in covering up the remains of old carts or farm implements that are too often left in most unsightly conditions about farm buildings. It is indeed pleasant to watch

it under these circumstances and note how rapidly it grows, and transforms what was unpleasant into a picturesque and often beautiful scene. The rapidity of its growth already referred to will always make it a subject of interesting study. The plant from which our illustration was taken sprouted from a seed in May, and before frost had rambled over bushes some thirty feet away. It had many hundreds of branches. An estimate was formed of their number, and it was found that if these branches were placed end to end they would make a line of two thousand feet! Many of the lower leaves die as the growth progresses, but the calculation gave about one hundred square feet of leaf-surface on the vine at one time, from which an immense amount of moisture must be exhaled during the twenty-four hours. The stem at the ground is no thicker than a lead-pencil, and the reader can imagine how rapid must be the flow of water through this narrow stem in order to supply the enormous exhalation. We look with wonder on the mammoth tree of California and similar vegetable productions,—but not less wonderful are the facts of plant-growth everywhere about us, and in few things are they more strikingly illustrated than in the growth of the star-cucumber.

It grows in most of the states east of the Rocky Mountains, except the extreme northeast and northwest portions.

ASPLENIUM EBENOIDES.

L. PRANG & COMPANY, BOSTON.

ASPLENIUM EBENOIDES.

SCOTT'S SPLEENWORT.

NATURAL ORDER, FILICES.

ASPLENIUM EBENOIDES, R. R. Scott.—Fronds evergreen. Barren fronds spreading, four to six inches long, lanceolate, pinnate at the base, pinnatifid towards the apex, tapering into a slender prolongation; apex rooting; rachis black. Fertile fronds eight to ten inches long, nearly upright, pinnate at the base; pinnules of unequal length, an inch or more long, linear lanceolate; frond tapering into a slender prolongation which is sinuous and proliferous, mid-rib permanent to the apex; fronds more membranaceous than Asplenium pinnatifidum, which, with the black rachis, distinguishes it from that species. (R. Robinson Scott, in *Gardener's Monthly* for September, 1865. See also Gray's *Manual of the Botany of the Northern United States*, Chapman's *Flora of the Southern United States*, and Eaton's *Ferns of North America*.)

THIS interesting fern has a remarkable history. A single plant was discovered in 1862, eight miles from Philadelphia, on the west bank of the Schuylkill, by Robert Robinson Scott, then gardener to Mr. Kennedy, of Port Kennedy. Mr. Scott was no ordinary man. He was related to some of the wealthiest families of Belfast, in Ireland, where he was born and received an excellent education. He was a proficient in most of the ancient and many of the modern languages, and early developed a taste for natural history, and especially for Botany. He went through a course of study in the Botanic Garden of Glasnevin, and subsequently in the Royal Gardens at Kew. His father had a passionate love for his native land which the son inherited, and their course in this respect estranged them from their relations, and finally reduced them to absolute poverty. It was particularly a trait in the young botanist's character that he would sacrifice on the instant every prospect of usefulness in his chosen scientific career, for his ideal of liberty and freedom.

Thus it became impossible for his scientific friends to aid him to any great extent, though conscious of his eminent talents. His botanical acuteness enabled him easily to place any unknown plant from any part of the world in its systematic relationships, and in a remarkably short time to discover its proper name and history. Had he retained his proper faculties he might have become a prince in Botany. He came to America in 1848, taking up with the horticultural profession for a living. In 1867–8, his mind gave way, and he died a few years ago in the State lunatic asylum at Harrisburg.

It is no wonder that so acute an observer should have detected a new species in this solitary plant. But it was strange that he could find no leading botanist in America, to whom he submitted specimens, to agree with him, or give him the slightest encouragement in his researches—as he thought, because he was but "a poor gardener." Satisfied, however, that it was new, he described it himself with an illustration in the magazine above cited, but still no notice was taken of it in our own land. He then thought he would try the European botanists, and in 1866, one year after his own description, the Rev. M. G. Berkeley noticed it in "the Journal of the Royal Horticultural Society of London" in July of that year as "probably a hybrid," but retaining Mr. Scott's name. This little piece of history has its valuable lesson. It teaches the student to search carefully for facts; and when he, himself, is sure of the facts, not to be too easily disheartened because others do not at once see things as he does.

Since Mr. Scott found his single plant, several others have been found in the same vicinity by Mr. Bourquin, a botanist of Camden, New Jersey; by Miss Julia S. Tutwiler, of Greene Springs, near the Black Warrior river; and by W. H. Leggett, at Canaan in Connecticut. Mr. John Williamson, in his "Ferns of Kentucky," published in 1878, remarks: "We have in Kentucky all the Aspleniums found in the Northern United States, except the somewhat doubtful *A. ebenoides*,"—but before the sheets of

his little work were scarcely from the press it was found, in July of that year, in Franklin county, in that State, by Professor R. W. Wildberger. It is, therefore, probable from these several recent discoveries in widely separated localities that it will yet be found in many other places, and the probability will give increased interest to fern explorations.

Miss Julia Tutwiler finds the plant in considerable quantity in her location, and, in a letter dated April 15th, 1879, to the writer of this, she thus describes her experience with it: "Our residence in Alabama is in latitude 32° 47′ north, longitude 87° 45′ west, eight miles from the Black Warrior river. The black-lands, or cotton-lands, formerly prairies, covered with cane and with cedar-hummocks near there, lie about fifteen miles south of us. Where we reside the soil is either red clay, or a mixture of sand and gravel, except in the creek and river bottoms. The face of the country is rolling, covered with hills from one hundred to two hundred feet above the level of the sea. We find no stones here except conglomerate, or 'pudding-stone,' as it is familiarly called. The geologists say the whole formation here belongs to the tertiary. I was agreeably surprised some years ago to find some miles away from our home, in a deep glade formed by the gradual work of a little brook which now runs through it, several plants which I have never found around our home, though I know these woods quite well. One of these was the *Asplenium ebenoides*, which then seemed to me so peculiar that I sent a piece to a botanical paper, and learned from the editor that it had been found in only one place in the United States before. The Virginian saxifrage, the Walking-fern, and several others quite common in the north, are here, but only in this deep shaded glen with the *Asplenium ebenoides*."

An interesting question in connection is conveyed in Mr. Williamson's expression, "somewhat doubtful species." Dr. Berkeley, above cited, thought it a probable hybrid, but apparently only because a single plant was found growing with *Camptosorus*—the "Walking-fern," and *Asplenium ebeneum*. Miss Tut-

wiler does not mention the latter species, which probably also grows near the Alabama location; but the association need suggest hybridity no more than in the case of others also often found associated. Again, those who have experimented with them, tell us it is extremely difficult to produce hybrid ferns. When germination of the spore takes place, a small green blade called the prothallus is formed. On the surface of this little cups appear, which represent the different sexes in flowering plants, and the fertilizing dust, or pollen, as we should say in flowering plants, is ejected from the one class, and has to fall into the other. The chances of the fertile vesicle, or, as it is technically called, the archegonium, receiving fertility from any other source than its own prothallus, are found to be very slim indeed. As a means to make it more probable, hybridists sow the spores of two species in immense abundance thickly together, so that when the prothallia develop they may be pushed up on edge, and in that way the antherozoids or "pollen" be more likely to be thrown into the receptive vesicles of the other species. One experimenter reports that of millions of plants so favorably raised for hybridization, he yet never saw but two undoubted hybrids. With this difficulty it is scarcely within the probabilities that a hybrid between the Walking and the Ebony ferns should appear in so many different and such widely separated locations.

EXPLANATIONS OF THE PLATE.—1. Plant of natural size from Miss Tutwiler's location. 1. 2. 3. Various enlarged sections of pinnules from different parts of the plant,—showing variations in the venation.

COMMELYNA VIRGINICA.

L. PRANG & COMPANY, BOSTON.

COMMELYNA VIRGINICA.

COMMON DAY-FLOWER.

NATURAL ORDER, COMMELYNACEÆ.

COMMELYNA VIRGINICA, Linnæus.—Stems usually decumbent; leaves lanceolate, acute, or acuminate, contracted at base into sheathing membraneous petioles; peduncles mostly two within the bract,—one usually more slender; rather erect, longer and one-flowered, or sterile,—the other commonly three-flowered; odd petal colorless, ovate lanceolate, about as long as the lateral sepals. Plant nearly glabrous. Stem about a foot long (three or four feet when supported in hedges) terete. Leaves two to four or five inches long, and half an inch to an inch wide; sheathing petioles about half an inch long, striate with green nerves, pubescent along the margins. Peduncles half an inch to an inch in length, inclosed in the recurved conduplicate bract, both before and after flowering. (Darlington's *Flora Cestrica*, under the name of *Commelyna angustifolia?* See also Gray's *Manual of the Botany of the Northern United States*, Chapman's *Flora of the Southern United States*, and Wood's *Class-Book of Botany*.)

GREEN, an English writer on gardening, in the early part of the present century, tells us that "Commelinas have but little beauty, so that, after the seeds come up, two or three of each sort is all that are worth retaining;" but it must be remembered that in the days when this judgment was given few plants except those with large or highly-colored flowers were thought beautiful. The more nearly a Rose resembled a cabbage in form and size, the more it was esteemed,—and possibly a large red Pæony would have been considered the acme of perfection. But the science of beauty has progressed as well as other sciences, and now few of its students would take our plate and study it in the light of its teaching and not pronounce it beautiful. Of course it is not gay; but in the gracefulness of its lines, the harmony of its proportions, the contrasts of its quantities, and the great variety of its special features, there are few plants richer in the elements of the beautiful. But to see it in its rare perfection, we must

visit it in its native places, and study it in connection with all its surroundings. In these situations it often gives a charm to the aspects of nature that is almost indescribable. One such spot on the Wissahickon near Philadelphia is now in the writers' mind, fresh and vivid, though it is years since the picture was painted there. The narrow path had been worn so deep by the rains of ages that a bank of many feet high lined its sides. Naked rocks projected from the banks here and there; and ferns, grasses, and flowering plants lovingly strove to cover them. At the top were Red Maples, Dogwoods, and Hornbeams, which made a partial shade, but did not wholly screen the sun from the earth at the base of the bank, where, and by the path's side, the little "day-flower" struggled up,—now rooting in the ground to hold itself,—now hanging its branches from the rocks,—gaining continually in its struggle upwards, but growing so luxuriantly and seeming so happy in its gains! Day by day, the little blue flowers came out to cheer and encourage the plant in its work,—just opening, smiling approvingly, and then sinking at once to rest.

> "The dew stole up
> From the fresh daughters of the earth, and heat
> Came like a sleep upon the delicate leaves,
> And bent them with the blossoms to their dreams,"

as in the days when, according to Willis, Abraham went forth to make his fearful sacrifice. In the morning, before the dew has wholly stolen away, and in the months of July and August, is the time to see it at its best. Then the blue flowers are most numerous. Sometimes as much as one-fourth of the whole green bed of foliage is bedecked with the cœrulean blue.

But the child of science will find abundant interest in it independently of the beauty it affords. In our description we have adopted Dr. Darlington's sketch, because it agrees so remarkably with our drawing, which is also from a Pennsylvanian plant, though he has not described it under its present name. Dr. Darlington says: "I have specimens from the South of *C. angustifolia* with really narrow lance-linear leaves; yet ours with its lanceolate

leaves seems to be referred to the same species. Three of the anthers are comparatively abortive and cross-shaped,—and a fourth one is partially so modified, or in process of metamorphosis to that state;" but it is now conceded that the species is variable, and that *C. angustifolia* of Michaux is the same as *C. Virginica* of Linnæus. Elliott, an early botanist, named another form *C. erecta*, and this is also referred to our present species,—the *C. erecta* of Linnæus being another and distinct one. What with variations and synonyms, the student may have some trouble in identifying his collections. It is only in quite recent times that botanists themselves seem to have agreed on the identities of these variations,—and if the student is not one inclined to believe that facts accurately told are just as well at least as those inaccurately given, and is satisfied to be "not wise beyond what is written," he will have some trouble in reconciling some of the statements connected with its family history. Dr. Gray, in his "Manual," gives Dillenius as the author of the name *Commelyna*, "dedicated to the early Dutch botanists, J. and G. Commelyn,"—but in his "School Botany" he tells us that Linnæus named the genus for more than two of them. "There were three Commelyns, Dutch botanists; two of them were authors, the other published nothing. In naming this genus for them, Linnæus is understood to have designated the two former by the full-developed petals, the latter by the smaller or abortive petal." Linnæus, however, in his *Genera Plantarum*, credits Plumier with the authorship of the name, who published a work on American plants in 1703, while Dillenius, who was Professor of Botany in the University of Oxford, issued his "Hortus Elthamensis" in 1732,—and Milne, in his "Dictionary" of 1770, states that "Plumier named this genus *Commelina*, from John Commelin, a Dutchman, Professor of Botany at Amsterdam, and author of two botanical works, entitled, *Hesperides Belgiæ* and *Hortus Amstelodamensis*." All the old botanists gave the orthography as Commelina, modern botanists always use Commelyna. Dr. Gray adopts the latter in his "Manual;" but in his "School

Botany" he has it Commelyina—the latter doubtless an oversight, but a curious one as though intended to combine both forms. The student may learn from this little sketch of the family name that it requires great care in history to avoid error, and that it is always well not to take even the most careful authorities in final judgment when any opportunity offers for review.

Commelyna has been taken as the type of the natural order *Commelynaceæ*, the only other genus of the order in our country being *Tradescantia*, and these are particularly interesting through being the most northern representatives of the order. It is not a very extensive family, there being not more than two dozen good genera in the whole; but of these the chief are inhabitants of the East and West Indies. The order is also well represented in Africa. It is one of great interest to botanists, as being an advance from simpler organisms towards true Lilies. There is, however, a distinct calyx and corolla, while in the six parted perianth of the true Lily these distinctions are nearly abolished. From its neighbor *Tradescantia* it is readily distinguished by its irregular corolla. In the latter the petals are of one uniform size, and set at regular distances from one another.

The roots of our common day-flower make a nutritious vegetable when cooked, but it is not in use because other vegetables of a similar character successfully compete with it.

It is found along the eastern seaboard States from Florida to New York, thence westwardly to Michigan, and southwardly east of the Mississippi river.

NYMPHAEA [illegible]VA

L. PEANG & COMPANY, BOSTON.

NYMPHÆA FLAVA.

AUDUBON'S YELLOW WATER-LILY.

NATURAL ORDER, NYMPHACEÆ.

NYMPHÆA FLAVA, Leitner.—Root-stock erect. Leaves ovate-orbicular, spotted, lobes sharp-pointed. Flowers, yellow. (Mrs. Mary Treat, in *Harper's Magazine*, vol. 55, p. 365.)

IN Thomas Moore's delicious poem, Lalla Rookh, he tells us of

> "Those virgin lilies all the night
> Bathing their beauties in the lake,
> That they may rise more fresh and bright
> When their beloved Sun's awake."

This is in allusion to the well-known fact that the flowers of the water-lily open early in the morning about sunrise, and close before the evening time. But if we carry the imagery further than the poet intended, we may say of the present species that it has been bathing its beauty in a very long night in the Florida lakes, for only recently have we had any certain knowledge of its existence, and this through the keen investigations of a noted botanist, Mrs. Mary Treat, of Vineland, New Jersey, who gave us the first detailed account of it in the number of "Harper's Magazine" above cited. Botanists, however, were made partially acquainted with it through a colored drawing in Audubon's "Birds of America," published in 1843. In his picture No. 411 he represents a swan, *Cygnus Americanus*, swimming among a lot of yellow water-lilies, which he calls "*Nymphæa flava*, Leitner." This swan is an Arctic bird. About the middle of September flocks come down from the

northern seas to Hudson's Bay, remaining till October, when they go south to more congenial climes. Large numbers reach the Chesapeake Bay, where they find a favorite food in the *Vallisneria spiralis*, known to sportsmen as "wild celery;" and when the season arrives for leaving this location they then cross the continent to the Columbia River and the shores of the Pacific Ocean, on their way back to their Arctic home. Audubon says they have never been seen beyond Cape Hatteras, in North Carolina. As this water-lily has not been found in the waters frequented by this swan, it is not surprising that botanists regarded Audubon's lily as a mere creation of the artist's fancy. Leitner, however, is said to have been a young German botanist who collected in Florida, and was killed there by the Indians. There, therefore, still remained the probability that Audubon had taken a drawing of Leitner's to assist his swan without a thought of the geographical incongruity, and the giving of Leitner's name, *Nymphæa flava*, supports this supposition. Mrs. Treat's discovery of this lily, in Florida, shows that Leitner may have seen it there, though her plant differs from that pictured in Audubon's work. In this drawing the leaves are ovate-oblong, and the lobes are rounded at the base, of a clear uniform green without spots, and the yellow of the flowers is very light. Mrs. Treat's plant differs, as we see by our picture, and only the belief that it must have been the plant intended by Leitner entitles him to the retention of the name he gave it.

In "Harper's Magazine," as already cited, Mrs. Treat proposes for it the name of *Nymphæa lutea;* but this brings to mind that Linnæus classed what we now call *Nuphar*, or as it is commonly called along the Delaware, the "splatter-dock," with the true Nymphæas; and that one, now *Nuphar lutea*, was *Nymphæa lutea* then. It is true that in botany a name rejected may be taken up again for another species, but in such a case as this it would lead to confusion with a synonym,—an evil botanists endeavor to avoid. It may be remarked here that there is no great difference between *Nuphar* and *Nymphæa*, except in

general appearance, the chief distinction being in the connection of the seeds with the placenta, or material out of which the seeds seem to grow. In the true *Nymphæa* there is a fleshy matter proceeding from the placenta between it and the seed, called the arillus, which in *Nymphæa* encloses the seed. In *Nuphar* this is wanting. There are other differing characters in the pistil, the stamens, and the petals, but not greater than we often find in the sub-divisions of other genera.

Supposing the subject of our chapter to have been the same species as Leitner saw, we may speak of it as re-discovered by Mrs. Treat, and her account of the event is extremely interesting.

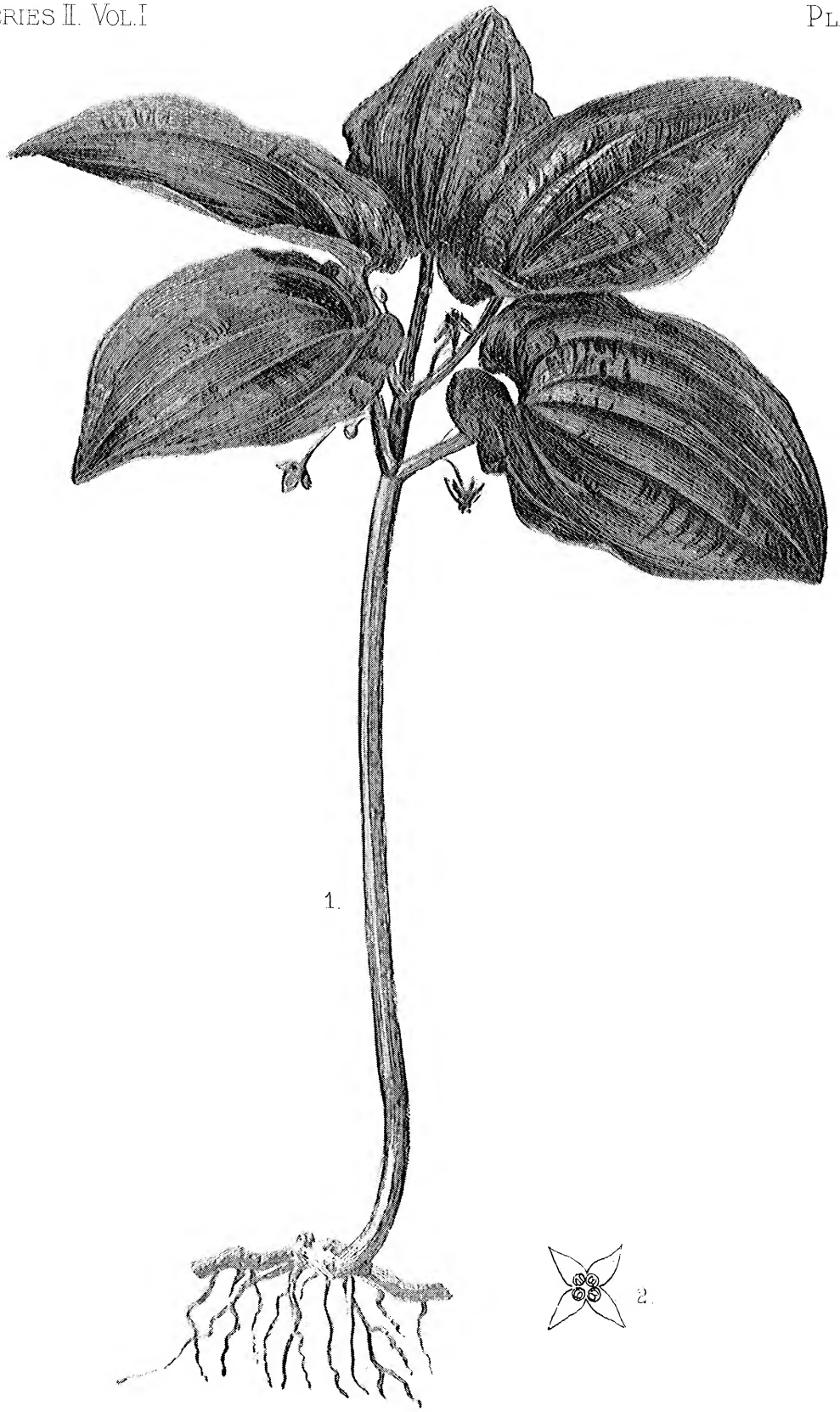
"In the valley by the river
In the bosom of the forest"

she found herself ready for a journey up the St. John's, and she says: "On my excursion in the row-boat I was attracted to the nearest cove, where acres of the water were covered by a beautiful variegated leaf of a strange water-lily, which bore a yellow flower. I saw it was a *Nymphæa*, but its manner of growth and its whole appearance were so unlike our white water-lily, that I knew it must be a distinct species, of which no mention was made in the Text-Books of Gray or Chapman." By the help of Dr. Gray and Professor C. S. Sargent, it was identified with Audubon's plate. Describing its growth, Mrs. Treat says: "The beautiful leaves lie thick upon the water; and in May, when the flowers appear, it is one of the grandest sights I ever beheld. It grows in water from one to five feet deep, the length of the leaf stems and flower scapes depending on the depth of the water. How far it extends remains to be seen. I have traced it about forty miles along the St. John's, and it grows all about Jacksonville, thirty-five miles below us. How it has so long escaped the botanist is a mystery."

But not only the lovers of nature in her popular aspects, and as she may present them to us in forest or lake, have to thank Mrs. Treat for this re-discovery of Audubon's "Golden Water-

Lily;" the close student of plants as well as the more acute botanist will be pleased with the study of the growth and development of the plant itself. The "common white water-lily" has a thick creeping rhizome or main stem,—in this species the root-stock is erect (Fig. 3). This seems to be in the main made up of imperfectly developed leaves, just as the scales of a true lily bulb are formed. During the next year roots come out from these scales, and, when they die, as they do in the following fall, they leave each scale pitted as seen in our enlarged drawing (Fig. 7). From some of these, however, one thready point, at first as like a root as the rest, proceeds onward, and finally makes a young plant capable of flowering in the autumn of the same season (Fig. 4). From the study of this thread in its early life we may learn how nearly allied in their nature may be a root and the runner, as the thread is called in popular language. This young plant has a remarkable history. It proceeds onwards a foot or so and takes a short rest, but produces a cluster of small tubers which make no leaves that season at least (Fig. 5), and then proceeds with another phase of growth terminating this time in a small plant, without the slightest trace of tubers (Fig. 6). The exact purpose of these tubers in the economy of the plant is not clear, and the solution yet awaits some careful observer. It is evident that the plant could exist and perpetuate its race without them, and probably quite as well, but as nature rarely makes anything that is of no use to the individual, and nothing that is wholly superfluous in the general good of the organic world, its exact relation is worth tracing.

EXPLANATIONS OF THE PLATE.—1. Leaves and flowers from plants growing under Mr. Dawson's care in the Arnold Arboretum. 2. The rayed stigma. 3. Upright root-stock of the past year. 4. New plant from the old one on a thready runner about a yard long. 5. Cluster of tubers. 6. Secondary plant of the same season.



CROOMIA PAUCIFLORA.

L. PRANG & COMPANY, BOSTON.

CROOMIA PAUCIFLORA.

FEW-FLOWERED CROOMIA.

NATURAL ORDER, ROXBURGHIACEÆ.

CROOMIA PAUCIFLORA, Torrey.—Perianth deeply four parted, persistent, the spreading nerveless oval divisions imbricated in the bud. Filaments separate, thick, erect, inserted on the base of the perianth opposite its lobes: anthers short, oblique, with the connective short or wanting. Ovary globose-ovate, sessile. Stigma two-lobed. Ovules four to six. Fruit follicular, beak-pointed, at length two-valved. Seeds one to four, obovate, suspended from the nerve-like, at length free placenta, nearly covered by the fibres of the cord. Embryo minute, obovate. (Chapman's *Flora of the Southern United States.*)

IN giving a general view of the Flora of the United States we have endeavored to make the selections from as many different natural orders or botanical groups as possible, so as to assist the student in his botanical studies, at the same time keeping an eye in the selections, to those which, from their intrinsic beauty or other popular points of interest commend themselves to the mere lover of wild flowers, or to those who simply wish to follow in the wake of polite intelligence. But in looking about for a representative of the natural order *Roxburghiaceæ*, we are deprived of all choice, as it has but the single genus *Croomia* in the United States, and this genus is represented by a single species only, *Croomia pauciflora*, the plant now illustrated. Yet aside from this reason for its present introduction, and even were it objected that it has little beauty of coloring to claim our attention, there are so many points connected with its botanical and popular history, and so much that is particularly instructive to the student, that it would be unjust to the aim and objects of our work not to give it an honored place among our "native flowers."

Our first knowledge of the plant came from the great botanist Nuttall, who described it as *Cissampelos pauciflora* in the "Journal of the Academy of Natural Sciences of Philadelphia." This genus, *Cissampelos*, is placed with the "Moon-wort" family, or *Menispermaceæ*, but on fresh specimens from Mr. Croom and Dr. Chapman coming into the hands of Dr. Torrey, he decided that it was not of that family, but belonged to the Berberries, or *Berberidaceæ*, and this of course necessitated another name for the genus, so he dedicated it to one of the above collectors, Mr. Croom, retaining Nuttall's specific name—*Croomia pauciflora*, or the "few-flowered Croomia." Our bibliographic works refer to Torrey in "Annals of the New York Lyceum," but the student will be surprised to find that there is no such paper there; and its non-appearance in that serial after being read before the body is believed to be the result of a personal trouble, which shows that even a model of amiability may after all be simply a human being with weaknesses like unto ourselves. The first description really appears to be in the "Flora of North America" by Torrey and Gray, issued in 1840. It is here said of it: "We consider this plant a reduced form of *Berberidaceæ*: it is, however, remarkable for its persistent sepals, suspended seeds, and in being apetalous (having a calyx but no corolla). It would be impossible to determine from the habit of the plant whether it were dicotyledonous or monocotyledonous; and the embryo is so minute that the cotyledons cannot be distinguished, but the structure of the rhizoma is exogenous, a circle of spiral vessels surrounding the central pith." It is here that one of the interesting facts about *Croomia* is developed. As most readers know, the great divisions of the vegetable world—the monocotyledons, or those plants with one seed-leaf, and the endogens, or those which have the wood arranged without concentric circles—are regarded as about the same thing; as also are the dicotyledons, or those with two seed-leaves, and the exogens, or those arranged with circles of wood, as in our ordinary timber trees. But in time it was found that notwithstanding the exogenous

stems of *Croomia*, the plant was really monocotyledonous, and this necessitated again a removal to *Roxburghiaceæ*, a very small order of Asiatics, not far removed from the Arum-like plants. On the other hand, it is extremely interesting to note that the *Menispermaceous* plants, with which our *Croomia* was at first associated, though certainly dicotyledonous, often have endogenous wood, and is thus on the exact opposite side of the scale. Yet another very interesting fact may be noted in the same connection. Sachs, in his celebrated "Text-Book of Botany," shows that the normal condition of *Menispermaceous* plants is the trimerous verticil, or one formed on the plan of three, and as this is the usual type on which endogenous plants are formed, it would not be at all improbable that the early relationship, as suggested by Nuttall, was not so very far away after all; and the student will not fail to observe that though for systematic purposes the great divisions of the vegetable kingdom have to be spoken of as if they are divided by lines definitely drawn, they are yet so closely blended by nature, that there is no doubt one has grown out of, and was once a part of the other; and it proves the unity of plan on which are formed the many diversified features of vegetation.

Another very remarkable fact in connection with *Croomia* is noted by Professor Asa Gray in the "American Agriculturist" for 1875. Some forty years previously Mr. Croom discovered in Western Florida a kind of yew, subsequently named *Torreya taxifolia*, and underneath the trees were growing plants of the *Croomia*. Now in Japan another species of *Torreya* has been discovered, and also beneath this Japan species another species of *Croomia* has also been found growing; and as both the yew and the *Croomia* are very rare, only a few localities being known for them in this country, the companionship of the two in these different parts of the world is among the most wonderful facts in botanical geography. Thus, though we may not see much beauty in the plant itself, we cannot but be interested in the wonderful story it tells, and we may truly exclaim with Thomson,

"And not a beauty blows,
And not an opening blossom breathes in vain."

Mr. H. B. Croom, in whose honor this genus was named, was one of the most enthusiastic of Southern botanists during the second quarter of our present century. "Silliman's Journal," during 1833, 34, and 35, contains numerous articles from his pen, which made us acquainted for the first time with many valuable facts concerning Southern plants. He studied the curious pitcher plants, or *Sarracenias*, particularly, and his monograph of them is regarded as one of the most valuable legacies to science. He was born in Lenoir county, North Carolina, in 1799. He was educated for the law, but gave up all for the study of natural history. He with his wife and family were all drowned in the wreck of the steamer "Home," off the coast of North Carolina, in 1837.

ASPIDIUM NEVADENSE.

L. PRANG & COMPANY, BOSTON.

ASPIDIUM NEVADENSE.

SIERRA NEVADA SHIELD-FERN.

NATURAL ORDER, FILICES.

ASPIDIUM NEVADENSE, D. C. Eaton.—Root stock rather short, creeping, densely covered with the persistent bases of the former stalks; fronds standing in a crown, one and a half to three feet high, thin membranaceous, lanceolate in outline, pinnate; pinnæ sessile, linear-lanceolate from a broad heavy base, deeply pinnatifid, the lower pairs distant and gradually reduced to mere auricles; lobes crowded, oblong, entire or sparingly toothed, slightly hairy on the veins beneath, and sprinkled with minute resinous particles; veins about seven pairs to a lobe, simple or a few of the lower ones forked; sori close to the margin; indusium minute reniform, furnished with a few dark colored marginal glands, and bearing several long straight-jointed hairs on the upper surface. (D. C. Eaton's *Ferns of North America.*)

O the thoroughly informed and systematic botanist the discovery of a new species is unwelcome. His herbarium has been arranged according to some favorite author's plan or according to some approved system of his own, with neat catalogues or numbered check lists to correspond, when newly discovered species appear and his work has generally to be gone over again. The young botanist, however, works with very different feeling. The discovery of a new species is a great delight to him, and much of the zest with which unexplored regions are searched is in the hope that they will yield the zealous naturalist something new. California and the regions west of the Rocky Mountains have been particularly disastrous to those botanists who comparatively few years ago had perfected their systematic arrangement. This territory had much to do with the suspension of the *Flora of North America* commenced by our famous botanists in 1838,—but the hosts of new plants found since that time have added the collectors' laurels to

many a distinguished name. Amongst these are particularly prominent those of two ladies—Mrs. Pulsifer Ames, and Mrs. Austen—who, according to Professor Eaton, first discovered this fern "in moist meadows and along creeks in the Sierra Nevada of Northern California, especially in a meadow containing also the Darlingtonia Californica (the Californian Pitcher Plant), near Quincy, Plumas County;" and "from Berry Creek Cañon, Butte County, by Mrs. Ames." Professor Eaton named it from this location, *Aspidium Nevadense*, and it forms plate X. of the work referred to for the description. No date is given with the appearance of the parts of this standard work, and it may perhaps save disputes in the future as to the priority of names if we here fix 1878 as the date of Professor Eaton's description. It will thus be seen that it is a very recent discovery; indeed all we know of it is from the account given in Professor Eaton's work, and the examination of living specimens from which our drawing was made, kindly furnished by Professor C. S. Sargent, of Cambridge Botanical Garden. The name, however, is unfortunate, as it will lead to the supposition that it is from the State of Nevada, and even so far as the Sierra Nevada, Mountains of California are concerned, Plumas and Butte Counties, where the ladies found this fern, are not in the true Nevada but in the Lassen range; and thus the name is still less pardonable than that for the New York fern, *Aspidium Noveboracense*, which is by no means a "New York" fern, as the Latin name implies. These two species have a very close relationship to each other, and it was no doubt this relationship which suggested to Professor Eaton a similarly local name. One of the most striking differences from this eastern species will be noted in the short stout root stock, while those who have taken from the earth the "New York fern" will remember the slender cord-like rhizome with the apex far ahead of the fully formed frond. This slowly developing rhizome brings all the fronds together in a tuft, and it follows that the general appearance of the growing plant is very different from that of its eastern relative.

Then the fronds are much narrower, being generally not more than one-tenth of the length. In these and other respects however it is probable the species will exhibit the variations so often found in ferns. Our plant differs in some respects from the one illustrated by Professor Eaton. Though his description calls for "a few of the lower veins forked," the drawing has the upper and lower ones in this condition. We find no tendency to forking in the veins of our specimen. The venation or arrangement of the veins is very pretty in this species. The lower veinlets are nearly opposite and give a palmately branched appearance. In most ferns the arrangement is usually alternate. Like the "New York fern" this species appears to be deciduous. In the specimen illustrated the barren frond has already faded, and the fertile one is preparing to follow. Our specimen is undersized to accommodate our page, and hence only a few of the upper pinnules are fruitful.

A very interesting circumstance in connection with the life-history of the species is given in Professor Eaton's work from a letter of Mrs. Austen. She says that the divisions of the pinnæ of the fruiting frond are closed or folded together early in the day. In the cool of the morning they were unfit for the botanical press from this peculiarity. About two or three o'clock of the same day she found them flat and in excellent condition for the collector's purposes. Professor Eaton remarks that Mrs. Austen had found on subsequent occasions the same phenomenon, but was unable to say whether it was brought about by alternations of "light or darkness, dampness or dryness, or heat or cold."

With the rapid development of our railroad system, and the increased facilities for travelling, it will not be long before many of our readers will be able to make the acquaintance of this pretty fern in its natural home as well as by the aid of Mr. Lunzer's admirable drawing. In the meantime they will be anxious to cultivate it, and no doubt before long it will be offered for sale in the catalogues of some of our enterprising fern-florists.

Mountain ferns, as a rule, are rather impatient of the summer air of the Eastern States, or of other places at low elevations. It is not that they object so much to the heat as to the dry air of the long summers. Those who would succeed with it under culture should therefore keep it in the shade near some rivulet or fountain if such be convenient, or at least under the shade of a rock, wall, or fence during the summer season; and in the close, moist air of a fern-case during the winter. Species which grow naturally on walls, rocks, or open places, do well in rooms when fully exposed to the atmosphere, unless it be charged with sulphurous gases.

EXPLANATIONS OF THE PLATE.—1. A rather young plant from a specimen grown at the Arnold Arboretum. 2. Portion of a pinnule, showing the venation, sori, and the scattered resinous dots.

NYMPHÆA ODORATA.

L. PRANG & COMPANY, BOSTON.

NYMPHÆA ODORATA.

SWEET-SCENTED WATER-LILY.

NATURAL ORDER, NYMPHACEÆ.

NYMPHÆA ODORATA, Aiton.—Leaves orbicular, cordate-cleft at the base to the petiole, five to nine inches wide, the margin entire; stipules broadly triangular or almost kidney-shaped, notched at the apex, appressed to the root-stock; flowers white, very sweet-scented, often as much as five and a half inches in diameter when fully expanded, opening early in the morning, closing in the afternoon; petals obtuse; axil much longer than the distinctly stipitate oblong seeds. (Gray's *Manual of Botany of the Northern United States.* See also Chapman's *Flora of the Southern United States,* and Wood's *Class-Book of Botany.*)

FEW flowers have excited the enthusiasm of the poets as much as the common lily; but among these few our pure white water-lilies must be ranked, and indeed the sentiments born of the one are often identical with those incited by the other.

Bryant, in his beautiful poem of the "Child and the Lily," exclaims:

> "Innocent child and snow-white flower!
> Well are ye paired in your opening hour;
> Thus should the pure and the lovely meet
> Stainless with stainless, and sweet with sweet."

And though it is probable that the poet had the white eastern lily in view, the sentiment is just as applicable to our sweet water-lily; a flower which the emblematists have dedicated to purity. Joaquin Miller expresses just the same idea, when he says:

> "The lily on the water sleeping,
> Enwreathed with pearl, and 'bossed with gold,
> An emblem is, my love, of thee."

The "Sleeping Beauty," as suggested by the water-lily to Miller, seems to have occurred also to Oliver Wendel Holmes, who says of it, in his "Star and the Water-Lily:"

"What is the lily dreaming of?
Why crisp the waters blue?
See, see, she is lifting her varnished lid!
Her white leaves are glistening through."

In their descriptions of lake and river scenery, the poets make frequent and good use of the water-lily. Shelley writes of

"—— floating water-lilies, broad and bright,
Which lit the oak which overhung the hedge
With moonlight beams of their own watery light."

And in Longfellow's "Evangeline," we are told that

"Water-lilies in myriads rocked on the slight undulations
Made by the passing oars——"

This pretty picture of the flowers rising and falling with the undulations of the ripples seems also to have impressed other observers. In Mrs. Hemans' well-known lines to the water-lily, we read:

"Oh, beautiful thou art,
Thou sculpture-like and stately River-queen!
Crowning the depths, as with the light serene
Of a pure heart.

"Bright lily of the wave!
Rising in fearless grace with every swell,
Thou seem'st as if a spirit meekly brave
Dwelt in thy cell.

"Lifting alike thy head,
Of placid beauty, feminine, yet free,
Whether with foam or pictured azure spread
The waters be."

Even the ancients had an idea of a queenly style of feminine grace and beauty in association with the water-lily, for it is to them we owe the name *Nymphæa*, which dedicated these pretty flowers to the nymphs or goddesses who presided over the waters. The name is mentioned in this connection by Pliny, as

well as by Theophrastus and Dioscorides, two of the earliest Greek writers extant. This ancient water-lily of the Greeks, which they named *Nymphaia leuca*, still grows where they saw it, in the lakes and ponds of Thessaly, and is the *Nymphæa alba* of modern botany. Our species, *Nymphæa odorata*, differs from this one of the ancients and of the old world chiefly in the size and fragrance of the flowers. The earlier botanists supposed it to be the same species, and Gronovius speaks of it as the *Nymphæa alba*, with "full and sweet flowers;" and Wildenow, though recognizing Aiton's name of *N. odorata*, remarks that "it is different only in size," which is not strictly correct, as there are usually a greater number of stigmatic rays, more strongly nerved leaves, and some other slight differences. Torrey and Gray regard *N. reniformis* of Walter, and *N. minor* of Decandolle, as good varieties; and Rafinesque gives others, as *parviflora*, *rubella*, and *chloriza* (yellow root). Besides the variations in the leaves and roots, there are shades of colors in the flowers. It is not in every case that

> "The water-lily to the night,
> Her chalice rears of silver light,"

as Sir Walter Scott would say; for varieties of a deep-rose as well as silver are often met with, an illustration of which we have given in the upper flower of our plate. The leaves and sepals are often tinged with red, even in the pure white petaled flowers, so that the transition of the whole flower to a deeper color is one that might be expected. Rafinesque writes of the rosy-flowered kind as if it were common in "New York and Ohio," and says it is not as odorous as the white kind. Of special locations for the rose-colored forms Cape Cod and Falmouth, Mass., are among the best known.

The fact that our "white sweet pond-lily" often comes with rose-colored flowers, so long recognized here, does not seem to be known to the cultivators of flowers in Europe, as the recent discovery of a rosy variety of the European white species in a

lake in Sweden is thought by the horticultural papers to be a great and valuable novelty. Another white species of the old world, *N. dentata*, also has a red variety, so it would seem that we may look for these dark variations in any light-colored species.

The pond-lily is not only famous in poetry and in popular history, but in its more matter-of-fact character has much to be proud of. Dr. Riddell, a famous botanist of the past generation, says: "The *Nymphæa odorata* grows in Lake Champlain, and its juice is good against inflammations, burns, scalds; and the seeds are good in thirst, vomitings, and diarrhœas."

Rafinesque says that "its properties are similar to the *Nymphæa alba* of Europe, but much more effective and decided. The roots are chiefly used, and are kept in shops in New England." Of its peculiar composition, he says it has "starch, mucilage, sugar, resin, ammonia, ulmine, and tartaric acid," and amongst its powers is that of "dyeing of a dark-brown and black color with iron." He says further that the "leaves are excellent food for cows and cattle," and that "in Canada they are eaten in the spring boiled for greens." And the ladies will be glad to know that "the fresh juice of the roots, mixed with lemon-juice, is said to be a good cosmetic, and to remove pimples and freckles from the skin."

It is remarkable how large a number of popular names the water-lily has received. In the middle ages it was known in different places in Europe as Swamp-weed, Swamp-poppy, Venus' Club, Venus' Finger, Hercules' Club, Water-can, and Water-socks. In our country, according to Rafinesque, our species has been known as Toad-lily, Cow-cabbage, and Water-cabbage.

Of the European form, Linnæus noted that the flower raised itself out of the water and expanded about seven o'clock in the morning, and was fully closed again about four in the afternoon.

EXPLANATIONS OF THE PLATE.—1. 2. Flower and unopened bud of the common white form. 3. Opening bud of the rose-colored variety, from a specimen furnished by Mr. Jackson Dawson.

LOBELIA FEAYANA.

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LOBELIA FEAYANA.

DR. FEAY'S LOBELIA.

NATURAL ORDER, LOBELIACEÆ.

LOBELIA FEAYANA, Gray.—Slender, a span high, diffusely branched from the base, glabrous throughout: leaves small (a quarter to half an inch long), repand-detinculate, roundish or obovate, or the small uppermost spatulate or lanceolate and sessile; raceme loosely four to ten flowered; pedicels as long as the flower, twice or thrice the length of the subulate bract: calyx tube and capsule broadly obconical; the latter two-thirds inferior, its free apex about the length of its subulate calyx lobes; these only half the length of the tube of the bright blue corolla: anthers glabrous (except the bearded tips of the shorter ones): seeds oblong, with a rough cellular coat. (*Gray's Synoptical Flora of North America.*)

WHEN the lover of flowers who is not a botanist in the strict sense of the term, hears a botanical name mentioned for the first time, he is very likely to ask what is its English or common one? It is not that botanical names are really more difficult to remember than others, but that a sound is not easily retained while unfamiliar. When once a botanical name enters into common language, no one ever thinks of it as difficult. Thus in the present case there is, strictly speaking, no English name, but the botanical name *Lobelia* has become so familiar to all, that it has been received into every-day language, and no one now thinks it a name hard to remember. The little dwarf Lobelia of our gardens—the *Lobelia erinus* from the Cape of Good Hope—has made the genus well known to most of us. The name itself is rather an old one, having been established by Plumier, who, as Milne tells us, was "an ingenious Frenchman, noted for his discoveries among American plants." These works on American plants were published in Paris, at various times between 1693 and 1713. Lobel, after whom he named the genus, flourished nearly a century before, and was an author of

considerable repute among his contemporaries and successors. Gilibert, a French author, who, in 1798, published a history of the plants of Europe, especially refers to Lobel in terms of respect. He was Flemish by birth, having been born at Lille, but settled in England, "where," says one author, "he published several learned botanical treatises." He was appointed botanist and physician to King James the 1st of England, and died in London in 1616.

It appears, however, that the species which were originally used to commemorate Lobel have been removed to another genus, *Scævola;* and others, which had been placed in the genus subsequent to its original formation, were left to bear the honors of the old family-name. Great numbers of species once Lobelias have been removed to other genera, but it is still formidable in number, perhaps not less than two hundred being still considered as true Lobelias. They are scattered over most parts of the world, many of them being found on the American continent. Dr. Gray, in his "Synoptical Flora of North America," enumerates twenty-three, besides many marked varieties worthy of distinctive botanical names; and it is very remarkable, considering how widely the species are scattered over the world, that not one has been discovered, as yet, on the Pacific coast. Some species grow as far west as the Rocky Mountains. New species, however, are still being discovered, several having been found of late years, and the present one, *Lobelia Feayana*, is among the most recent of these modern discoveries. Dr. Gray received it from South and East Florida, through Dr. Feay, Dr. E. Palmer and Mrs. Mary Treat; and from the last named the plants were obtained, which, on the grounds of the Bussey Institute, enabled our drawing to be made. It is said to be remarkably effective among the early spring flowers of this flowery land, and when generally introduced to garden culture, will no doubt be as great a favorite as its African relative, the common blue Lobelia, which, in so many respects, it resembles. One of the greatest differences will be noted in the lip, which, in our species, is of three

angular lobes. The garden Lobelia has the lip also in three divisions, but these divisions are mere slits; indeed at a little distance the lip looks almost entire, and seems to have a regular semi-circular outline.

The whole structure of *Lobelia* is very interesting, and no less so the natural order to which it belongs, *Lobeliaceæ*. The plants of the order are not very far removed from the Aster family or composites on the one hand, and the Campanulas or Bell-flowers on the other; and in connection with these two afford a very pretty lesson respecting transition or gradation between great bodies in the vegetable kingdom. If we take a single flower of an Aster, we find the single pistil divided at the apex, the five anthers united together with their faces inward; the pistil is at first shorter than the anthers, but ultimately lengthening, and pushing out as it grows the pollen from the tube formed by the united stamens. In Lobelia we have a monopetalous corolla, somewhat divided, and bursting irregularly on one side as composites do when forming strap-shaped florets. The calyx is generally united with the ovary, and the calyx lobes may be regarded as the equivalent of pappus or setæ, which often crown the seed. It is chiefly in the ovarium that we first note any great distinction. In *Lobelia* the seed-vessel contains numerous small seeds, while in the composite there is but a single seed. But with the numerous points of correspondence we might expect to find some time a composite with more than one seed in the capsule, or a *Lobelioaceous* plant with but a single one. And this is really the case in the latter instance, for there are some few genera of *Lobeliaceæ* which have but a single seed. Few would ever mistake a *Lobelia* for a composite on a first acquaintance, yet we see how difficult it is in a search to trace very closely the essential points of difference. The same difficulty will occur on the other side with *Campanulaceous* plants. If the anthers were united here, and the pistil had a curving tendency, instead of the regular bell-shaped flower we find in *Campanula* we should have a structure probably bursting

on one side, and in many other points, perhaps, resembling a *Lobelia*. In fact different degrees of cohesion of parts which necessitate growth in accordance, or degrees of intensity or of direction in the growth waves,—apparently slight causes—account for the actual differences which divide some of the great families of plants from one another.

The manner in which the pollen reaches the stigma and thus fertilizes the flower has given rise to a great deal of speculation. It is only after the pistil has pushed itself through the mass of pollen that the stigmatic surface at the apex becomes exposed. It seems very difficult for it to receive any of its own pollen on this account, and the only way in which it can be fertilized is by receiving pollen from other flowers by the aid of insects. This view is held by Darwin and others. But it is certain that *Lobelia erinus* will produce seeds freely when insects fitted for the work of bringing pollen from a distance are wholly excluded, and it is well worth studying how the pollen, necessary for fertilization, is carried to the stigmatic surface. The species now illustrated, *L. Feayana*, is so nearly related to the species employed by Mr. Darwin in his experiments, that it has suggested this reference to Mr. Darwin's views.

EXPLANATIONS OF THE PLATE.—1. A small plant, full size. 2. Enlarged flower, showing the form of the three-cleft lip. 3. Pistil, showing its curved form and circle of hairs beneath the bilobed pistil. 4. Longitudinal section, showing the pistil surrounded above by the united anthers before it has pushed its way through them.

CYNTHIA DANDELION,

L. PRANG & COMPANY, BOSTON.

CYNTHIA DANDELION.

THE DANDELION CYNTHIA.

NATURAL ORDER, COMPOSITÆ.

CYNTHIA DANDELION, Decandolle.—Acaulescent; scapes leafless, single, one-flowered; leaves elongated, lance-linear, entire or remotely toothed, rarely pinnatifid, the primary leaves oblong-spatulate. Scapes six to eighteen inches in height, several from the same root. Leaves some of them nearly as long as the scapes, more generally entire; when pinnatifid, the lobes are two or three on each side, triangular. A variety in the mountainous districts produces at length a short, decumbent stem. (Wood's *Class-Book of Botany*. See also Gray's *Manual of the Botany of the Northern United States*, and Chapman's *Flora of the Southern United States*.)

AMONG the best known plants is the Dandelion, and when its yellow buds appear even children hail them as the harbinger of spring. As one of the earliest of spring flowers it has received particular attention. Our own poet, Percival, makes it an especial feature in his well-known "Ode to Spring:"

"The yellow buds are breaking,
The flowers in meadow are blowing;
And gentle winds are playing
Along the grassy vale,
Around the airy mountain,
And down the grassy vale."

But the common Dandelion is not a native flower. It came to this country with the white man, soon made itself at home, and is now found wherever cultivation goes. Nor is there any allied species of the genus native to the United States. But, in ancient times, our plant was supposed to belong to the genus *Troximon*, which is closely related to *Taraxacum*, the true Dandelion; and when we see the root-leaves (Fig. 4), and the long, slender achene (Fig. 3), it is not surprising that, in the condition of

botanical science at that early period, the Dandelion should have suggested itself. How long the name Dandelion has been connected with it does not appear, though as *Troximon Dandalion* it is described in Persoon's works about 1807. But its supposed relationship to the Dandelion seems to have been noted by Gronovius, who made it *Tragopogon*, which is a closely allied genus, and the one to which our common garden salsify belongs. The description which one of our earliest collectors (Clayton) sent to Gronovius is so illustrative of the general accuracy of the botanists of those days, that we may do well to refer to it here:

He says: "The flower is large, showy, of a sulphur color, the stalk striate; leaves long, narrow, toothed, with soft spines set on the margins; the outer florets expand while the inner ones remain closed (see our Fig. 5), the calyx then assuming a conical figure (see Fig. 6); seeds like the purple-flowered Tragopogon but smaller (Fig. 3)," many of these points, as we see, corresponding exactly with our plate. At this early period, however, botanical relationships were not understood as they are now, especially the relationships of the composite order, and our plant, after being thought a *Tragopogon*, a *Troximon*, a *Krigia*, and *Hyoseris*, was given a separate place of its own, as *Cynthia*, by David Don, in the "New Edinburgh Philosophical Society's Proceedings," in 1829, and it has remained *Cynthia* ever since. Professor Gray, in his "Manual," says *Cynthia* is "perhaps from Mount Cynthus," and Professor Wood that "Cynthia is one of the names of Diana." It might be as well to explain to the general reader that Cynthius is one of the ancient names given to Apollo, and Cynthia to Diana, and that Mount Cynthus was dedicated to both deities, so that the derivations of these two authors are seen to be more in accord than they might appear, in the absence of this explanation. David Don, who named the genus, was very fond of giving classical names to plants, and often, as in this case, without any apparent reason for their association with the genera he selected for them. While on the subject of names, it may be remarked that the common name,

Dandelion, is a corruption of the French, which means "Lion's tooth," and is in allusion to the tooth-like margins of the leaf of the true Dandelion, which the root-leaves of our plant resemble.

The *Cynthia Dandelion* is one of the earliest flowers of its season in the districts where it grows. This district, in a general way, may be described as from Maryland west to Kansas, and from there southwardly to Texas. The flowers are often open before the frosts are wholly gone; and before March has departed the "yellow buds" break forth in all their spring beauty, and clothe the meadows with their brilliant flowers. In the more mountainous districts, as noted by Professor Wood, the stem often branches a little; and, as this character was overlooked in the diagnosis of the first describer, that form has been given a new name, *Cynthia montana*, and it is in this condition that our artist has taken it from a specimen furnished by Mr. Jackson Dawson, of the Arnold Arboretum, but, as it is the same species, it is not worth while to perpetuate a separate name.

On critically examining *Cynthia Dandelion*, the student will find many points of general interest. The root-leaves will be noted as having the base so tapering as to be almost like perfect leaf-stalks, and with the largest or widest diameter at the end (Fig. 4). But, on the flower-stalks, this order seems to be inverted. The base widens, and the apex becomes more slender in proportion to the distance from the root-leaves (Fig. 7). The soft spines, or teeth, however, remain about the same size on both classes of leaves. But, when we come to the flower, we find that the strap-shaped florets are wider at their termination than at their bases, and, in this respect, take after the root-leaves in their general outline; and this lesson will be found very common in plants of this order. All the parts of plants are but modified leaves; but the phases of rhythmic growth decide what form the new modifications shall take. When a flower is to be formed in a plant of this character, a wave of growth starts from between the root-leaves. As the little waves, marked by each stem-leaf, get weaker, the forms of the leaves change in accordance with

the decrease in growth force. When this great rhythmic wave is nearly exhausted, a new current starts again to form the parts of the flower, and we may reasonably look for the same form of modified leaves (petals) in the first start of this new wave growth, as we found in the first start in growth of the wave which formed the flower-stalk.

EXPLANATIONS OF THE PLATE.—1. Branching stem. 2. Flower stem with head showing the expanding involucre in fruit. 3. Achene with double pappus, the outer short and scale-like at the base of the long hair. 4. Root (slightly tuberous) with root leaves. 5. Flower, with all the florets strap-shaped, the interior not yet expanded. 6. Faded flower showing the conical involucre. 7. Enlarged somewhat amplexicaul base of the stem-leaf.

CERATOPTERIS THALICTROIDES.

CERATOPTERIS THALICTROIDES.

THE HORNED FERN.

NATURAL ORDER, FILICES.

CERATOPTERIS THALICTROIDES, Brongniart.—Sori continuous, arising from two principal longitudinal but slightly anastomosing veins or receptacles on each side between the costa and the margin. Capsules lax, scattered on the receptacles, sub-globose, sessile, obscurely reticulated; annules very broad, nearly complete, or reduced to five or six indistinct articulations, or quite obsolete. Involucre membranaceous, continuous, formed of the reflexed margin of the frond, which are very broad, and meet at the back. Seeds or spores few, very large, obtusely trigonal, each of the three faces beautifully concentrically striated, filled with an oleaginous substance. (Hooker's *Species Filicum.*)

JAMES GATES PERCIVAL, one of the sweetest American poets of the early part of the present century, tells us—

"'Tis pleasant to stray in a tropical grove,
Where flowers, fruits, and foliage are blended above,
Where the sky, as it opens so vividly through,
Is pure as a spirit in mantle of blue,
Where the wind comes perfumed from the orange and lime,
And the myrtle is ever in bloom in that clime,
Where the citron its green and its gold ever wears,
And the birds are forever caressing in pairs;—
O, 'tis pleasant a while in those groves to remain,
Till spring comes to visit and charm us again."

One might almost imagine the poet had the modern Florida in mind when he penned the above lines, for in these days of easy communication with distant places, thousands of people find it pleasant to remain a while in its orange and myrtle groves, till spring returns to charm them back to their northern homes.

But it is not only the enchanted wanderer among Florida's tropical groves, or the one who delightfully breathes in its perfumed atmosphere, who is grateful for the modern means of

transportation to this fairyland,—the student of natural history and especially of botany feels equal gratitude for present facilities to explore the inmost recesses of its forests; and though it is now over three hundred years ago since Captain Jean Ribeau gave the account of his "Voyage to Florida," nearly as many new plants are discovered in this long known land as in some of the newer territories of the United States.

The subject of our present sketch is one of these recent discoveries. Indeed the only published note of its existence that we find in American literature as we write is in the "Catalogue of the 'Davenport Herbarium' of North American Ferns," where it is recorded as having been obtained from "Prairie Creek, in slow moving water, Southern Florida," the specimen "gathered in July, 1878, and donated by Professor D. C. Eaton." The specimen from which our drawing was made is growing in the greenhouse of the Arnold Arboretum, near Boston, under the charge of Mr. Jackson Dawson. As it has not, therefore, found its way into our books of reference, we have had to go to a European source for the description already cited, which is of the genus. As there is only one known, it does for the specific character as well.

Though a new discovery among the "Flowers and Ferns of the United States," it has been long known to botanists, having been figured by the old English author, Plukenet, before the time of Linnæus. Indeed, it is one of the most widely extended of all ferns, being found in the warmer parts of all the four quarters of our globe. To Linnæus, however, it seems to have been known only as a native of Ceylon in the East Indies, and the knowledge we have of its world-wide extension shows what great progress geographical botany has made. In his time, too, it was known as *Acrostichum thalictroides*, for the natural relationships of ferns were not known very well at that time, and it is chiefly within the past fifty years that the large fern-genera of the early fathers of modern botany have been broken up into sections convenient for more perfect study. Even so late as 1789, when the

natural system of Botany was made popular by the labors of A. L. de Jussieu, and the more natural groups of species gathered into distinct bodies, this great author enumerates only fourteen genera in all the large family of ferns. The separation from *Acrostichum* and formation into a separate genus as *Ceratopteris* dates from 1821, by Brongniart, who described and named it in a French work, the "Bulletin de la Societe Philomatique," but some authors contend that Kaulfuss had named and described it as *Euobocarpus*, a little before this, and so the plant has to be sought for in some European works under this name. However, Sir W. J. Hooker insists on *Ceratopteris* as being the prior, and hence the correct name. *Ceratopteris* is derived from two Greek words meaning "horned" and "Fern," and this name was evidently suggested by the reflexed margins of the frond meeting at the back, as noted in the description, which give the sori the appearance of being enclosed in a hollow horn. To some of the older botanists it was known as *Acrostichum siliquosum*, the specific name having been suggested by the same circumstance, that is, the rolled pinnule appearing like a silique, as the hollow seed-pods of cruciferous plants are termed. The specific name, *thalictroides*, is, of course, from a supposed resemblance in the fronds to some species of *Thalictrum*, or "Meadow-rue."

The anatomical structure of this fern gives it a more than usual interest to the botanist. The rings which surround the sporangia in ferns are nearly obsolete in this, and Sir W. Hooker was, therefore, at one time disposed not to regard it as a true member of the fern family. Again, it is peculiar in being an annual, while ferns in general are perennials, carrying over their rhizome or root-stocks from year to year. Like annual plants in other families, nature has made up for the shortness of its individual life by giving to it the means of rapid propagation. The spores are not as numerous as in most other ferns, but they have powers of ready germination, and Mr. John Smith, in his "Historia Filicum," observes that, in the plant-houses of Kew Gardens, young plants appeared wherever there was a moist

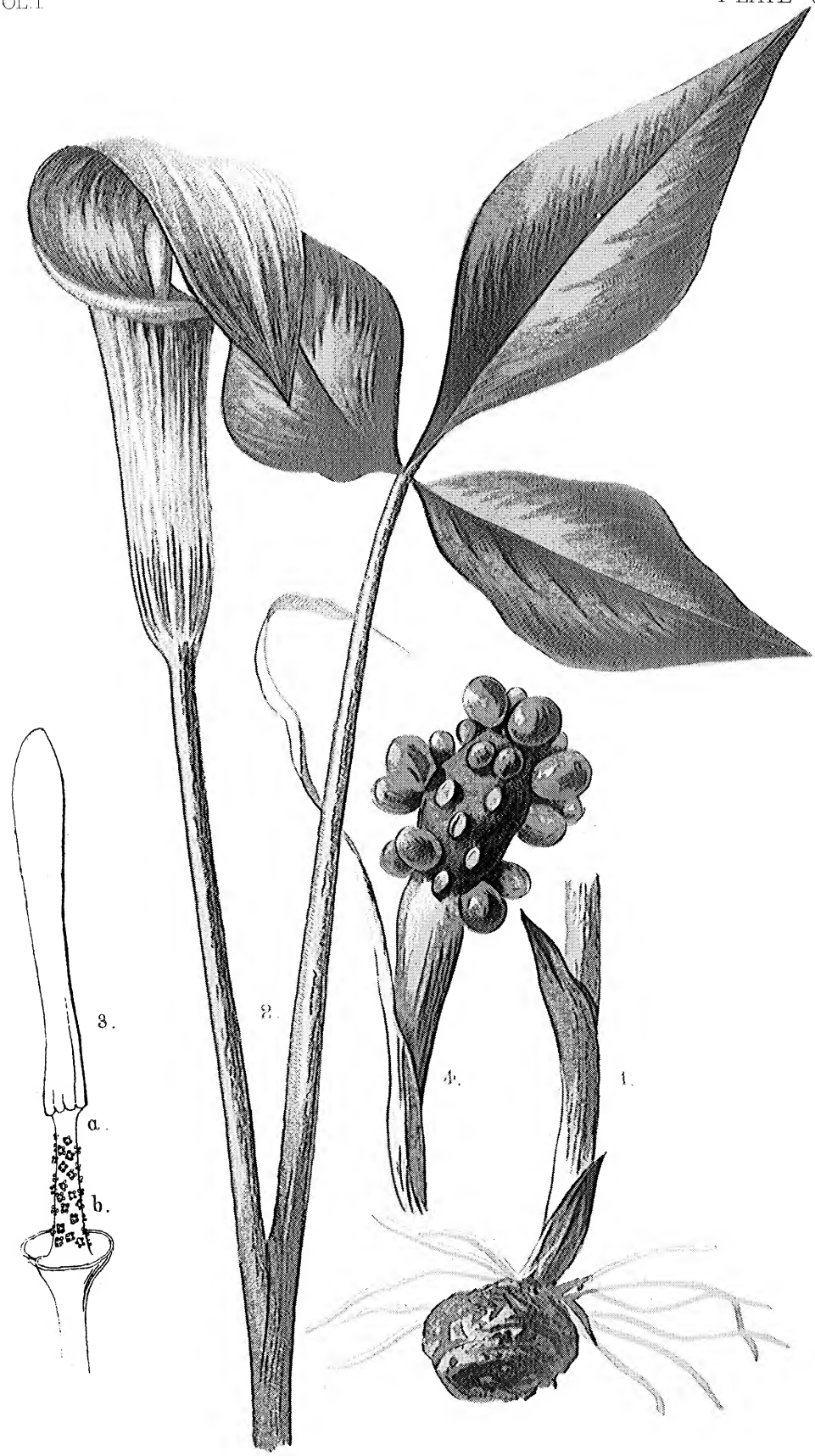
surface. Besides this, buds appear in the angles of the divisions of the frond, and, falling at maturity, make distinct plants.

In the uniform tint of green and heavy divisions of the frond, there is absent the usual beauty of ferns. But Whittier tells us that—

> "Art's perfect forms no moral need,
> And beauty is its own excuse;
> But for the dull and flowerless weed
> Some healing virtue still must plead,
> And the rough ore must find its honors in its use."

His lines are especially applicable to this "dull weed," which has been put to more honorable use than most of its sister ferns. Gaudichaud, a distinguished botanist, who edited the botany of Captain Freycinet's voyage of the "Uranie" and "Physician" in a French expedition round the world in 1810, notes that it is regarded as a choice salad by the inhabitants along the river Argana; and Sir W. J. Hooker states that, "in the Indian Archipelago, this fern is boiled and eaten by the poor as a vegetable." It grows in shallow ponds or in wet, marshy places, often covering the whole surface with its green fronds.

EXPLANATIONS OF THE PLATE.—1. Growing plant showing (1*a*) perfectly developed barren frond, (1*b*) the growing frond and stipes of older ones. 2. An undivided segment of the frond showing, (2*a*) enlarged, its venation. 3. An enlarged drawing of a finely-divided pinnule.



ARISÆMA TRIPHYLLUM.

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ARISÆMA TRIPHYLLUM.

THREE-LEAVED INDIAN TURNIP.

NATURAL ORDER, ARACEÆ.

ARISÆMA TRIPHYLLUM, Torrey.—Leaves mostly two, divided into three elliptical-ovate pointed leaflets; spadix mostly diœcious, club-shaped, obtuse, much shorter than the spathe, which is flattened and incurved-hooded at the summit. (*Gray's Manual of the Botany of the Northern United States.* See also Chapman's *Flora of the Southern United States*, and Wood's *Class-Book of Botany.*)

THE plants of this genus were classed with *Arum* by Linnæus, and our present species was the *Arum triphyllum* of that great man. Under this name it was known to all our botanists up to about thirty years ago. The whole Arum family were but imperfectly understood by the older students. They saw that all had a certain general resemblance; but in time many new genera were founded, and the present one, *Arisæma*, was taken from *Arum* by Martius, a well-known writer in 1831 on the Flora of Brazil, and confirmed in the year following by Schott, a distinguished writer on *Araceæ*. The dates are important to the critical student, as in some works Schott is credited with the foundation of the genus. It has puzzled botanists to know what Martius derived the name of *Arisæma* from. According to Pliny, *Aris* was the name of some very bitter plant, and it was sometimes called *Arisaron* also. The roots and leaves of some European Arums are intensely acrid, and they are believed to be the same as are referred to by the ancient writers under the same name. *Arisæma* seems to have no meaning that is applicable to our plant. Some German botanists believe the name was intended to be written *Ariscema*. If it were *Arisema*, it would mean "hooded Arum," and this would

fit our species very well, for, as noted in the description we have adopted from Dr. Gray, the upper part of the spathe forms a standard or hood over the spadix to a more striking extent than in any other with which we are acquainted. However, as a plant's name is "but a name" and nothing more, the rule is to take the orthography as we find it, unless there be some grave violation of botanical taste. In regard to *Arum* itself Linnæus has been charged with violating the laws he himself had laid down. Rafinesque says: "Linnæus did very improperly, and against his own botanical rules, change the previous name of Tournefort *Arisarum* into *Arum*, which is a mere termination of many other genera;" but, as we have seen, *aris* and *aron* are only Latin and Greek names for the same thing, and Linnæus was within his rules of cutting off all superfluities. But this reference to Rafinesque's criticism shows how important botanists regard the rigid adherence to rules of nomenclature.

An interesting feature in our plant is the variations in color of the spathe and spadix; that is to say, of the vase-like portion of the inflorescence and the club-like process which occupies the centre. Sometimes these are wholly green, and at other times very highly colored; even the leaves are often spotted, and in these particulars it has a singular coincidence with a near relative, the *Arum maculatum* of Europe, and it may perhaps on this account claim some attention in connection with the legendary and poetical allusions associated with that species; for there is a legend in some parts of Europe that *Arum* was once wholly green, but became spotted and colored by the accident of growing near the foot of the cross at the crucifixion of our Saviour. Mrs. Hemans thus gives the story:

"Beneath the cross it grew;
And in the vase-like hollow of the leaf,
Catching from that dread shower of agony
A few mysterious drops, transmitted thus
Unto the groves and hills, their sealing stains
A heritage, for storm or vernal shower
Never to blow away."

The different colors of the spadices—some light and some dark, though most frequently yellow—are much sought after in the English species by young plant-collectors in the early English spring under the names of "Lords and Ladies," the handsful of the dark ones being the Lords, while the lighter ones are the Ladies. They were also in the olden times called "Wake Robin and Cuckoo-points," these names not having any English meaning as one might suppose, but being corruptions of very old French names, unless indeed there may have been some connection with the flowering of the *Arum*, and the first visits in spring of the cuckoo, a migratory bird. This seems to have been the idea in Shakespeare's mind, who, in "Love's Labor Lost," makes the showman sing in the character of Ver,

"When daisies pied, and violets blue,
And Lady-smocks all silver white,
And cuckoo-buds of yellow hue,
Do paint the meadows with delight,
The cuckoo then,"———

Some have indeed thought that Shakespeare may have meant the yellow butter-cups in this passage, because of the specified yellow, but the prevailing association seems to be with the English Arum. Clare, a well-known English poet, says:

"How sweet it used to be when April first
Unclosed the Arum leaves, and into view
Its ear-like flowers their cases burst,
Betinged with yellowish white or lushy hue."

The old English names are now nearly obsolete. For our plant in our country the most common popular names are "Jack-in-the-pulpit," "Preacher-in-the pulpit," and "Indian Turnip."

The last name is derived from the use of the roots as food by the Indians. When raw, every part of the plant is extremely acrid, and will blister the mouth or tongue when applied to either of them; but, when roasted or boiled, all of this acridity disappears, and the roots particularly are extremely nutritious. Green says in his "Botanical Dictionary," published in the early

part of the present century, that "it grows wild in wet places in Virginia, Carolina, Pennsylvania, etc., where the savages boil the spadix with the berries (see our Fig. 4) and devour it as a great dainty." It is said of the roots that one-fourth of the whole bulk is starchy matter fit for food.

Rafinesque, from whom we have already quoted, says that "it grows all over North America in woods; it is said to extend to South America as far as Brazil; but probably it is a different species that is found there;" and it might be added that "North America" is very different now to what it was in Rafinesque's time, for our plant is not known much beyond the Missouri and Mississippi rivers. To the eastward of this line it is found in every State of the Union. Though commencing to flower very early, it may often be gathered so late as June, when the leaves usually commence to decay. The berry-like seeds are at first green, but at maturity become red as in the plate. By this time the foliage has wholly disappeared, and the collector only knows where the roots are by the clusters of fruit standing on short stalks just above the ground.

The flowers are monœcious, that is to say the sterile ones are by themselves in the portion of the spadix at *a* (Fig. 3), and the fertile ones below at *b*. But the pistillate flowers are not all fertile, as we see in Fig. 4; only a portion of the berries are wholly perfect.

EXPLANATIONS OF THE PLATE.—1. Root and lower portion of the branch. 2. Upper portion of the stem in flower. 3. Spadix with flowers male (*a*) and female (*b*) at the base. 4. Mature fruit.

GERANIUM MACULATUM

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GERANIUM MACULATUM.

SPOTTED CRANE'S-BILL.

NATURAL ORDER, GERANIACEÆ.

GERANIUM MACULATUM, Linnæus.—Stem erect, dichotomous above; leaves three to five parted; petals entire, twice as long as the calyx. Stem twelve to eighteen inches high, hairy. Leaves two to three inches long, marked with pale blotches, radical leaves on petioles three to six or eight inches in length; stem leaves on shorter petioles, the uppermost subsessile. Flowers purple, large, subcorymbose. (Darlington's *Flora Cestrica*. See also Gray's *Flora of the Northern United States*, Chapman's *Flora of the Southern United States*, and Wood's *Class-Book of Botany*.)

NO "general view of the flora of the United States" would be perfect without one of the Geraniaceæ, so we give this now as the prettiest American representative of this very interesting family of plants. We have not many in America to choose from, for the genus *Geranium* belongs chiefly to the eastern hemisphere, where they number a hundred species, while there are only about half a dozen within all the wide boundaries of the United States. Some of the species of the old world were well known to the early Greeks. The name *Geranium*, though adopted from Pliny, the ancient Latin author, is really the Greek *Geranion*. *Geranos* is the Greek word for crane, a well-known, long necked bird; and as there is some resemblance in the half mature seed-vessels which in some of the species curve downwards from the summit of their slender stems, it is thought probable that the name was given to the plant by the Greeks from this resemblance; and from the name as associated with these drooping fruited kinds we have the common name of "crane's-bill." Many of the names of plants in use by the ancients have been applied by modern botanists to genera having only a distant

or no relation to those which bore the ancient names. It is pleasant to feel in the case of the Geranium that we can be really carried back by it into association with people who lived so many thousands of years ago.

Our "spotted leaved Crane's-bill" is closely allied to some of the European forms, and like them may lay claim to much of the beauty of detail that has made some of them so famous. A French author remarks that "the pencilled-leaf Geranium, to the negligent and careless observer, appears a simple, common flower; but examine it closely, mark the pink veins that meander in every direction over its petals, sometimes so delicate as to be scarcely visible; study it well, and the more you do so the more beautiful will it appear, and learn thence to admire the skill and ingenuity displayed in the Creator's works." In our species there are not only the delicate pink veins of the petals to be admired, but also the veining of the leaves,—the veins being prominent as well as beautifully arranged. This arrangement of the veins, or, as the botanist would call it, the venation, is of as much interest to the scientific student as to the lover of art. Very often we can tell by the veins the order to which a plant belongs, but in the present case we cannot distinguish these leaves from those of some of the *Ranunculus* or Crow-foot family. The root leaves of our Spotted Crane's bill and of *Anemone Pennsylvanica*, for instance, might be mixed together, and it would trouble the young student to separate them. And after all there may be a closer relation between the plants composing the *Geranaceæ* and those of *Ranunculaceæ* than botanists generally would be disposed to grant. If it were not for the lengthening of the styles or slender portion of the pistils, and their union into a sort of beak which gives it the "crane's-bill" character, there would be very little reason for not classing the Geraniums with the Crow-foots. Even as it is, we have nearly the same length of pistils in *Clematis*, and when the Geranium seed is mature there is the feathery tail which *Clematis* has. There are many other matters connected with the relationship of Geraniums to

other orders which are of too abstract a nature to refer to in a popular work; but the student will find the Geranium an excellent aid in this attractive study.

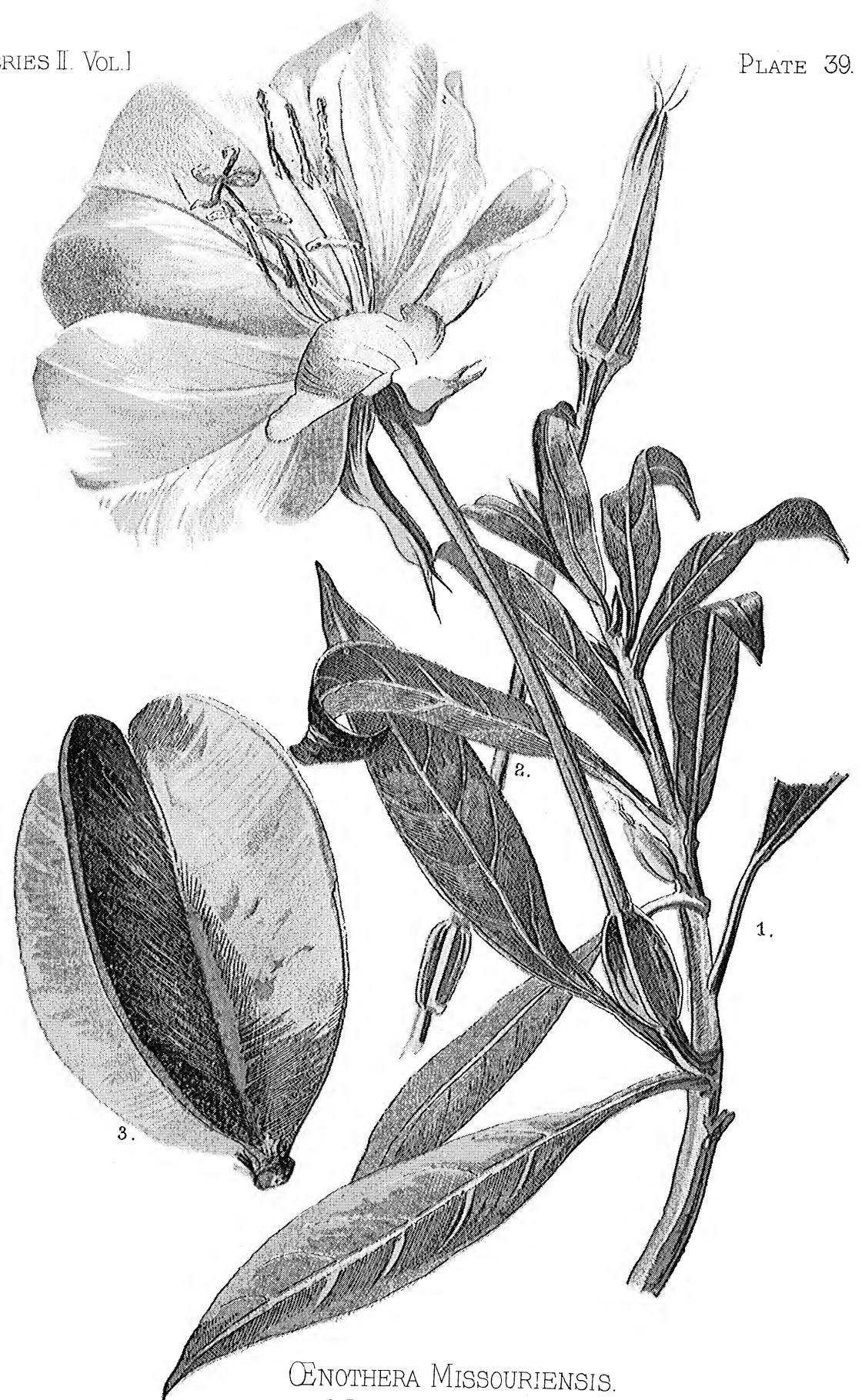
A very interesting point in reference to the *Geranium maculatum* is the fact that, though it is one of the most widespread of our native plants, it shows very little disposition to vary in the most widely separated locations. It is found almost everywhere from Canada to the Gulf of Mexico, and from the Atlantic Ocean west, almost to the Rocky Mountains, often when in open woods in the greatest profusion. In Kentucky, Virginia and Tennessee it is frequently so abundant as to make it difficult to walk through its herbage. In Pennsylvania, from whence our specimen was taken, and which induced the selection of Dr. Darlington's description, they are more scattered through the half-shaded woods; but still make no mean show among the pretty flowers which make a woodland walk in that State so pleasant in May and June. The only variations of importance are in the shades of color. Sometimes they are brighter than in our picture, and then again they are often found nearly white.

In addition to its artistic beauties, and its scientific interest, it contributes in a more material way to the wants of man. It was a famous remedy among the Indians for wounds, ulcers and hemorrhages, and has been found by many good physicians very useful in dysenteries, especially among children.

Many of the old world species have found favor with the poets and emblematic writers; but, so far as we know, Mrs. William Wirt, one of our most intelligent authors in this line, is the only one who has given our "spotted Crane's-bill" any attention. She dedicates it to "envy," as, she remarks, "it has not much beauty to recommend it, yet its retiring and modest worth, so generally overlooked for those (Geraniums) admitted to gay saloons, may well be supposed to excite something like the envy of its more favored rivals."

As noted in Dr. Darlington's description, the leaves are often marked with white blotches, and thus we have the Latin specific

name *maculatum;* but it is well that we have come to look on the names of plants as mere names, and nothing more, for very often the student would be unable to find any "spots" to warrant the "maculate" designation.



ŒNOTHERA MISSOURIENSIS.

L. PRANG & COMPANY, BOSTON.

ŒNOTHERA MISSOURIENSIS.

LARGE-FRUITED EVENING PRIMROSE.

NATURAL ORDER, ONAGRACEÆ.

ŒNOTHERA MISSOURIENSIS, Sims.—Simple, decumbent; leaves coriaceous, lanceolate, acute, short-acuminate, petiolate, sub-entire, downy, canescent when young; flowers very large, axillary; calyx-tube three or four times longer than the downy, canescent ovary; capsule very large, oval, depressed, with four broad-winged margins. (Wood's *Class-Book of Botany.*)

THE species of Evening Primrose here illustrated is well worthy of the beautiful picture our artist has made of it. Of course, much of the beauty of the representation is derived from the pretty red to which the stems turn as they mature, and which makes a good contrast with the greens and yellows of the other parts. It is a singular fact that it is almost impossible to find any plant without some trace of red about it, but this fact is generally overlooked by flower painters, and it is remarkable that it should be so disregarded, as by its use a much better effect can be obtained than in the usual style of flower painting, as well as being more just to the good taste of nature herself.

The Evening Primrose family is a very large one. Mr. Sereno Watson in his revision of the genus, in 1873, made sixty-eight species indigenous to North America; but though among them are many beautiful kinds there are few more striking in so many respects than the one we now illustrate. The size of the flower alone attracts. It is often much larger than the one we have chosen for our drawing. Some authors speak of having seen flowers six inches across.

The namesake of this, the common English primrose, has a

famous place in English literature. English poetry is full of allusions to it. Shakespeare refers to the flower in many of his plays; and in Cymbeline, especially, which is so full of floral references, Aviragus is made to say, after bearing the dead Imogen in his arms:

"With fairest flowers,
Whilst summer lasts, and I live here, Fidele,
I'll sweeten thy sad grave: Thou shalt not lack
The flower that's like thy face, pale primrose."

Though we have some species of *Primula* native to our Alpine regions—that is to say, primroses of a certain kind—we have nothing that will fairly carry with it any suggestiveness to the primrose of poetry, Primulas though they be. Some of the *Œnotheras* have a faint resemblance in form and color to the true Primrose, and from this fact we have the popular name Evening Primrose—"evening" because they rarely open when the sun shines. This habit of evening or night flowering has attracted much attention to the plant, and it has received a great share of attention from the poets, as well as the original "pale-flower" from which it derived its name. Bernard Barton, a well-known English poet, in his "Invitation to Flowers," addresses ours especially in view of its late opening:

"You, evening primroses, when day has fled,
Open your pallid flowers, by dews and moonlight fed."

The same author has a poem wholly devoted to the "Evening Primrose," too long for our pages, but full of happy imagery, in which hope and trust under affliction are the prevailing sentiments. He concludes the poem by observing:

"But still more animating far,
. . . . . .
We hope that, as thy beauteous bloom
Expands to glad the close of day,
So through the shadows of the tomb,
May break forth mercy's ray."

There is one passage in this poem, however, which deserves more than a passing note, on account of an observation by one

of our earlier botanists, as it shows how the good poet has to observe as closely, perhaps, as the botanist. He says:

"I love, at such an hour, to mark,
Their beauty greet the light breeze chill,
And shine 'mid shadows gathering dark,
The garden's glory still."

Pursh, when writing of an allied species, remarked that in the darkest night the flowers could always be plainly seen, but that they appeared white then instead of yellow, and he thought it might be owing to some phosphorescent property in the petals.

Again, we may give an instance of the correspondence between poetical observation and the observations of botanists, in a passage from Keats, another celebrated English poet:

"A tuft of evening primroses,
O'er which the wind may hover till it dozes;
O'er which it well might take a pleasant sleep,
But that it is ever startled by the leap
Of buds into ripe flowers."

And this immediate starting of buds into ripe flowers has been noticed especially in our species, one observer having heard the opening of the blossoms, so suddenly do they expand. Pursh tells us that in his observations this opening generally occurred about five o'clock in the evening.

In looking into its botanical history there seems to have been some ill feeling among the early botanists about the original naming of the plant, and the result is that different authors have different names for it. The first published description is by Sims, in the "Botanical Magazine," for 1814. A flower was sent to him from a plant growing in Mr. Nuttall's garden near Liverpool, by whom it was found in the neighborhood of the Missouri in North America, and on this he named it *Œnothera Missouriensis*. Pursh about this time was in London preparing for his "Flora of North America," and had permitted Sims to examine his manuscript, in which this species was described as *Œnothera macrocarpa*. Sims supposed his plant different from the one in Pursh's herbarium. Pursh's work appeared very soon afterwards

and showed that Sims' plant was really the same as his, and insisted on his name, chiefly because "the specific name is inapplicable, as it never was found anywhere else but near St. Louis, where Mr. Nuttall gathered ripe fruit of it, specimens of which I have seen." Mr. Nuttall follows, in 1818, with his "Genera of North American Plants," and sets aside both their names, and describes it as *Œ. alata*, for no other reason apparently than that it "more appropriately" represented the large-winged fruit (Fig. 3). Modern botanists, however, look on a name with no meaning as quite as good as the "most appropriate," and adhere strictly to the law of priority of description, and this gives the name of Sims' *Œnothera Missouriensis* as the correct one.

Mr. Nuttall tells us that it was first discovered by Mr. Bradbury, thirty miles from St. Louis "on the Merrimac," meaning of course the Missouri; but since then it has been found widely extended throughout the Southwest. It was even collected, in 1862, by Hall and Harbor in the Rocky Mountains, but is probably rare so far north, as it seems not to have been collected by subsequent botanists.

The botanical name *Œnothera* is a very ancient one. Linnæus believed it to be the "podded Lysimachia" of Theophrastus, a very ancient Greek writer. Of modern botanists, Sir William J. Hooker says it is from "*oinos*, wine, and *thera*, searching or catching, from the root having caught the perfume of wine;" but our American text-books tell us it is not that the root catches the perfume of wine, but that those who ate the root caught a greater taste for wine. The moderns, however, catch the taste for wine so easily that no herb is necessary to aid them; and, at any rate, whatever may have been the plant or the meaning intended by the ancients, we may remember that it could not have been one of our Evening Primroses, no matter how near the relationship may be guessed to be, as the genus *Œnothera* is wholly American, and, of course, was entirely unknown to the Greeks and Romans.

EXPLANATIONS OF THE PLATE.—1. One of several branches forming a plant. 2. An unopened flower. 3. A seed-vessel nearly mature.

ASPIDIUM MUNITUM.

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ASPIDIUM MUNITUM.

CHAMISSO'S SHIELD-FERN.

NATURAL ORDER, FILICES.

ASPIDIUM MUNITUM, Kaulfuss.—Stem tufted, four to nine inches in length, strong straw-colored, densely clothed especially below, with large glossy lanceolate scales; fronds one to two feet long, four to eight inches broad; pinnæ close, three to four inches in length, three-eighths to half an inch broad, the apex acuminate, the edge finely spinulose, serrated throughout, the upper side auricled and the lower obliquely truncate at the base; texture sub-coriaceous; rachis generally scaly; veinlets fine, close; sori in two rows near the edge. (Eaton's *Ferns of North America.*)

N Vancouver's celebrated voyage, Chamisso, the botanist of the expedition, collected largely on the northwest coast, and many of the ferns of that region especially were made known to us through his labors. Kaulfuss, the German botanist, who, in 1824, described the ferns of this collector, named this one *Aspidium munitum*. Professor Eaton well suggests that it may commemorate the original collector in its popular name, and hence we have "Chamisso's Shield-Fern." *Aspidium* is from *aspidion*, a Greek word denoting a little shield, which name was suggested by the shield-like structure of the involucre or indusium, as we may note in our Fig. 2. The specific name *munitum* may have been suggested by the munificent manner in which the plant is furnished with scales, which in strong plants forms a very striking character. The species is closely related to the Christmas Shield-Fern of the Atlantic States, *Aspidium acrostichoides*. This is also known to be very well clothed with chaffy scales, but not near to the extent that the *Aspidium munitum* is.

In a dried specimen, before us as we write, collected by Dr. Edward Palmer in southern California, the stipe at its junction

with the rhizome is so abundantly covered with broad, chaffy scales, as to look like the feathered head of a bird. Sometimes these chaffy scales extend a long way up the stipe or stem of the frond, occasionally reaching the foliaceous portion. It is, however, variable in these and other respects in common with most ferns. Judging by numerous specimens in the Academy of Natural Sciences of Philadelphia, the species is more than usually variable. Ten years after it was named by Kaulfuss, it was collected by Nuttall on Wyeth's expedition of 1834, and the specimens then obtained are so different from the original species, as to appear quite distinct, and are labelled in Nuttall's handwriting "Aspidium Columbianum," which is erased and under-written "Aspidium Oreganum," as it was uncertain whether or not to make it a distinct species. And the specimens vary very much in the size of the plants according to location. Palmer's from Gadalupe Island has a frond of over two and a half feet, with a stipe of more than a foot in length. A small and very narrow form is marked in Nuttall's collection "Aspidium Willamettense, from the Rocks of the Willamette." Fronds collected by Prof. Bolander from Oakland, California, are only about two feet in length in all, the stipe not being much over eight inches. The specimens collected by Bigelow in California, on the Whipple exploring expedition, are not more than six inches long, while others from Dr. Gibbon are about the size we have chosen for our illustration. Our specimen, however, Fig. 1, as may be seen by there being only a very small portion of the frond in fruit, is a comparatively young one, for in mature plants fully one-half of the frond may be fertile, just as we find under similar conditions the eastern *Aspidium acrostichoides*.

As in the case of the Christmas-Shield Fern of the East, the Western collector could not say he had to wait

> "Till the spring blossomed again,
> Till the birch first unfolded its leaves on the shore
> And the robin first warbled its strain,

as in the language of the poet Percival he would have to say

of flowering plants and many other ferns, before enjoying a study of its beautiful form, for like its Eastern relative it is evergreen and furnishes material in excellent condition for examination all through the winter season, and while yet, as Lowell would say, there are

> "Low stirrings in the leaves, before the wind
> Wakes all the green strings of the forest lyre."

In the correspondence of our botanical friends are many references to this beautiful fern which will give a fair idea of how it behaves when it is at home. In a letter from Dr. C. C. Parry, of Davenport, Iowa, who collected in California, we find "In the shade of Pine woods grow robust clumps of *Aspidium munitum*. In these situations it attains its greatest perfection. It is much in habit like the Eastern *A. acrostichoides*, and like that an evergreen when slightly protected by snow. It is very firm in its texture, and when, as they generally are, abundantly invested with fruit dots, they have a particularly rich appearance."

Dr. C. L. Andrews, of Santa Cruz, writes: "In moist, shady places of our section of country, we find *Aspidium munitum* usually in company with *Aspidium argutum* and *Pteris aquilena*. Sometimes it will find itself where some little stream trickles down a gulch under the shade of the Red-wood (*Sequoia sempervirens*), when it is of surpassing luxuriance, often three to four feet high, almost rivalling the *Woodwardia* of our coast in size. It will not live long after it finds itself in open spots, nor does it choose level places unless well sheltered and moist. When the atmospheric conditions suit, it is not particular about the soil, for it is found clinging to rocks and thriving in poor gravelly places. Moisture and a place to cling to it evidently regards as essentials."

Again, Dr. W. A. T. Stratton, of Petaluma, on April 12th, 1879, says: "Some of our ferns grow to a great size here. Some years ago I came on a group of *Aspidium munitum* and *Woodwardia radicans* in a deep ravine in Morin county, beneath

Sequoia sempervirens, which were grand beyond conception. Each frond swept in graceful curves, some bending even to the ground, with a majestic beauty that thrilled me, and I could not help uncovering my head in profound admiration." Mr. George C. Woolson, of Jersey City, writes that fronds are often found "five feet high, and we may regard it as one of the finest of our North American ferns," and he finds it to do well under cultivation. Shirley Hibberd's London *Gardener's Magazine* for February 8th, 1879, states that it has already been introduced to culture in the Royal gardens of Kew, where it proves to be "a handsome species, and very hardy, but being a rarity, a select place should be chosen for it." Dr. Andrews says "it is often cultivated as a house fern in California, but then the fronds become dense and dwarfed."

EXPLANATIONS OF THE PLATE.—1. A complete, but rather immature plant from the collection of the Arnold arboretum grown by Mr. Jackson Dawson. 2. An enlarged pinnule, showing the arrangement of the veins, and the disposition of the sporangia on them, as also the spinnulose margin. 3. Side view, enlarged, showing the shield-like indusium over the sporangia.

STENOSIPHON VIRGATUM.

L. PRANG & COMPANY, BOSTON.

STENOSIPHON VIRGATUS.

THE STENOSIPHON.

NATURAL ORDER, ONAGRACEÆ.

STENOSIPHON VIRGATUS, Spach.—Tube of the calyx filiform or almost capillary, much prolonged beyond the ovary, recurved or declined after flowering, at length deciduous; the limb four-parted, much shorter than the tube. Petals four, unguiculate, unequal. Stamens eight, erect, the alternate ones a little shorter: filaments capillary: anthers oblong, fixed by the middle. Ovary oval, one-celled, with four suspended ovules: style erect, filiform, dilated at the apex: stigma four-lobed. Fruit (very small) coriaceous and indehiscent, ovate, convex externally, flattish within, about eight-ribbed, one-seeded. (Torrey & Gray's *Flora of North America.* See also Porter's *Flora of Colorado.*)

THIS innocent-looking flower with a long Greek name was first discovered by Long's exploring expedition on the Arkansas river, in 1819. It was regarded by Nuttall as a *Gaura*, and named by him *G. linifolia*, under which name it is described in most of the works immediately succeeding that time. A more recent author, Spach, in a revision of the order *Onagraceæ*, separated this genus from *Gaura*, describing it as *Stenosiphon*, the name being derived from two Greek words signifying "slender tube," which is a very characteristic name in view of the remarkably long and slender tubes of the flowers. Up to this time there has been no species discovered but this one, and the whole generic character from Torrey and Gray is given instead of the mere specific description to which we usually confine ourselves. The species is found nowhere but in the United States, and not far beyond the location of its original discovery, the Arkansas, as given by Nuttall. Dr. Parry collected it in Colorado in 1861, and it is among the collections of Canby from the same region ten years later, as noted in Porter's *Flora of Colorado.* In the collections of Lindheimer from Texas it is described

as growing on high prairies and in rocky soil, and Ruffner says it is common in northern Texas. One author refers to it as being a peculiar feature of dry rocky knolls, covering with graceful beauty, spots on which little else will grow at all, and we may almost imagine it furnished the

"Rocks rich with summer garlands,"

in the

"—— savannahs where the bison roves,"

and

"—— where the desert eagle wheels and screams,"

of which Bryant tells us in one of his poems. These arid parts of our territory seem to be its chosen home. The plant illustrated was from Texas, and kindly presented to us by Dr. George Thurber. The drawing was made quite late in the season, after the plant had materially exhausted itself; and the first flowers were rather larger than we have represented, and the leaves during the early part of the summer are nearly as large as weeping-willow leaves. It grows vigorously in good garden soil, as if it did not need much coaxing to give up its love for its dry native home. It does not attempt to flower in Philadelphia gardens till frost may be expected to appear. But it transplants easily into a box or pot, and with very slight protection from frost blooms freely all the winter long. Torrey and Gray speak of it as a perennial; but in our experience it dies after flowering. Its woody roots are probably deceptive: at best it is perhaps but a biennial. It is however very easily propagated by cuttings, and in this way can be continued by the florist, without difficulty, from year to year. Its gracefully elegant racemose branchlets of rosy-tinted white flowers specially commend it to the artistic designer in flower work. It will be a popular winter-flowering plant when its merits in this particular become better known.

The lovers of peculiarities in structure will find in the long slender tubes, already noted, an interesting subject for examination. They are so long and slender, so hair-like, that if green

they might easily be taken without close examination for pedicels or flower stalks. It is difficult to conceive for what special advantage to the plant such a very slender tube is designed. The seed vessel, also, is remarkably small. After the flower has faded there seems to be nothing left in the axils of the bracts, and only the careful observer, lens in hand, is likely to discover that perfect seed-vessels have been produced.

It will also be an interesting study in connection with other plants of the order *Onagraceæ*, of which the *Fuchsia* and the Evening Primrose are familiar examples. The quaternary type, as represented in the four petals, four sepals, and twice four stamens, prevails through the whole order. In the length of the tube of the corolla if not in slenderness we may also find a parallel to our plant in many of the family. The *Œnothera* or "Evening Primrose" is also closely allied to it; but while so many of this genus open only at evening or morning, or during dull, cloudy weather, the *Stenosiphon* is an especial lover of daylight and bright skies.

Most of the order *Onagraceæ* give great pleasure to mankind by their beauty. Our gardens and greenhouses would be badly off without them. As subjects for the artist they are ever tempting his pencil or brush; and the artist, as his works abundantly show, is as ever ready to avail himself of their beautiful hues, colors, and elegant forms. We shall be very much surprised if the pretty addition we now bring to notice does not become as popular as its brethren, as there is so much that is truly artistic to recommend it.

The order has few qualities of any service to man beyond this simple gift of beauty; and the species we now illustrate is not known to have anything but its beauty to attract us to it. Its relationship to *Gaura*, a somewhat extensive genus, prevents our attention being so closely drawn to its solitary condition, as it generally is when a genus of but a single species stands entirely isolated from all near kindred. And yet there may be some advantages in cases of this kind, as we can better study the vari-

ous steps by which new forms have been introduced. Geology shows that the ancient flora of the earth was different from ours, and yet closely related to it. We find also that the members of our present flora vary under differing circumstances over the earth; and the tracing of the connecting links by which one part is bound to the other is no mean element in the pleasure of modern botanical studies.

Almost all pretty flowers have familiar or common names in addition to their botanical designations,—or they soon receive them. Very often all may see their fitness, but occasionally they are inappropriate. Where none has been given, some have been suggested in our work. In the present case the plant has no common name, and it is not easy to offer one from a translation of its Greek name, "Slender-tube," that is likely to be popular. Possibly in the future, when its late autumn attraction in the flower-garden is fully appreciated, it may be known as the "October-Beauty," just as we have a "Spring-Beauty," a "Meadow-Beauty," and so on. For the present we will content ourselves with "Stenosiphon."

ANDROSTEPHIUM VIOLACEUM.

L. PRANG & COMPANY, BOSTON.

ANDROSTEPHIUM VIOLACEUM.

CROWNED LILY.

NATURAL ORDER, LILIACEÆ.

ANDROSTEPHIUM VIOLACEUM, Torrey.—Bulb globose, tunicated, eight to nine lines thick, external membrane separate from the interior. Leaves four to six, appearing with the flowers, six to eight inches long, scarcely more than half a line wide. Scape two to four inches long. Spathe of three or four lanceolate, membranaceous pieces. Umbel three to four flowered, pedicels six to twelve lines long. Perianth violet, ten to twelve lines long. Crown three lines long. Style five to six lines long, drawn up above the crown. Segments two to two and a half lines long. (Baker in xi. vol. of the *Journal of the Linnæan Society of London*. See also *Botany of the Mexican Boundary Commission*.)

AFTER the war which occurred between Mexico and the United States, about the middle of the present century, large tracts of Mexican territory were ceded to the United States, by which its lines were very much extended. It became necessary to have a clear understanding as to the exact boundaries between the two countries, so a commission was agreed upon, by which officers from each should together make a survey. On the part of the United States, Lieutenant W. H. Emory was placed in charge of the party, receiving his commission from the President in 1854. Competent assistants in the various branches of science were appointed, and full collections of objects of Natural History made; and the results of their labors are known in literature as the "Reports of the Mexican Boundary Survey." The Botany of the expedition was worked up by Dr. Torrey, and it was here that he first described the genus *Androstephium* as now understood, the name being evidently derived from two Greek words referring to the crown-like arrangement of the stamens, so conspicuous in the centre of the

flower. The plant had been collected by others some little time before, but its place in the botanical system had not been accurately determined. At any rate, our knowledge of it is but of comparatively recent date, and even yet we do not know much of its habits or behavior, or what may be its contribution to the general aspects of nature in the places where it is found, for few collectors seem to have met with it, and those fortunate ones have not been able to tell anything materially of its local history.

This and allied Liliaceous plants are very interesting, botanically, as proving clearer than many other tribes do, the great unity of nature. The roots, the leaves, the stems, flowers and general structure of one species are so closely related to those of another, that it is almost impossible to fix on any certain and definite line whereby to divide them; and we can learn among these plants, perhaps better than among many others, that what we call genus, though a natural and not an artificial arrangement, as much so as day is distinct from night, yet runs so closely and insensibly into others that we are often justified in believing that the one has grown out of, or has been in some way connected with the other. Now, in the present case, its first observers seem to have regarded it as a *Milla*, a genus established by Cavanilles, a Spanish botanist, in 1793; but the "filaments united into a crown at the throat of the tube," in such a conspicuous way, and as well shown by our artist in the expanded flower, seemed to Dr. Torrey to be grounds for forming for it a new genus. But how slight this distinction is may be inferred from a remark by Dr. C. C. Parry, in his "Botanical Observations in Southern Utah," published in the 9th volume of the "American Naturalist," when, referring to a species of *Milla*, found there, he says, "which exhibits an equally well-marked corona (crown) sub-tending the stamens, thus apparently invalidating the distinctions which have been relied on for separating the allied genera of *Milleæ*." As to one of these "genera of the sub-tribe *Milleæ*," Dr. Torrey himself remarks, while establishing the genus, "the Mexican genus *Bessera* most resembles this, but it

differs in the very short tube of the perianth (the lower portion of the flower), in the tube of filaments having only a short tooth between the filaments, and in the form of the capsule." But in some of the allied genera the length of the tube would not be of much consideration. In some unquestioned Millas, for instance, the "tube of the perianth" is three-fourths the length of the whole flower, while in other cases it is no longer than we find in the subject of our present chapter. We thus see how difficult it will be for the student to decide on the genera of these Liliaceous plants, when he collects them for the first time. As a general rule the union or the separation of the parts is regarded as among the best characters. The theoretical structure of a lily flower is to have three sepals (the usual calyx), three petals (the corolla), and a similar series of two sets of three, resulting in six stamens and three pistils; and it is chiefly from the manner in which these various parts are united or developed in proportion to one another, that characters to distinguish the various genera are found. Sometimes, as in the ordinary lily flower, the apex of the pistil is divided into three distinct parts, but in our plant as we see in Fig. 2, the apex is inclined to be capitate, or terminating in a little pin-like head. This, though there were no other characters, would at once suggest to the student that it was not a *Lilium*. Then there may be characters drawn from the phases of growth, which, however, are not often referred to in botanical works, because so much has to be derived from dried specimens wherein these life-characters cannot be observed. In many plants the stamens and pistils finish their growth at or about the expansion of the corolla; but we see in our plant that the pistil is nearly complete long before the stamens, which do not take on their peculiar crown-like form until the segments of the "perianth" have fully expanded.

Again, the roots of these plants deserve more study for botanical characters than they have received. In our specimen there were several buds (Fig. 3), which seemed to indicate that new corms may be formed by offsets. And then at the base of the

corm we find a thick, fleshy, root-like projection (Fig. 4) extending downwards larger than the corm itself, and very different from the thready rootlets appearing from the upper portion. Why so much of the substance of the old plant should be spent in forming this fleshy root is not clear, unless the plant expects to get repaid for the exertion in the amount of moisture such a spongy mass may draw in, and which, in the dry places in which the plant usually is found, would be very desirable when the plant is in flower.

As we have said, little is yet known of it from its native places of growth. Dr. Torrey notes that his specimens were gathered by Dr. R. Gleason, near Fort Arbuckle, and that it grows "on hills and prairies, on the Rivers Blanco and Colorado in Texas," and so late as 1871, Mr. Watson, in Clarence King's Report, speaks of it as consisting of a single "Texan" species. But in 1875, Dr. Parry found it in Southern Utah, where, he says, it is quite common on gravelly hills near St. George, and among the earliest of spring flowers, to give a character to the remarkable scenery. Our illustration is probably from the same section as noted by Dr. Parry, as the specimen was kindly sent to us by Mr. John Reading, of Salt Lake City.

It makes a beautiful picture as drawn by our artist for the plate, and it will probably become a very popular hardy spring flowering "bulb" in our gardens.

EXPLANATIONS OF THE PLATE.—1. A complete plant in flower. 2. An unexpanded flower, cut down lengthwise to show the internal organs. 3. The old corm with young buds. 4. A thick, fleshy root, proceeding from the base of the old corm.

CASSIA CHAMÆCRISTA.

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CASSIA CHAMÆCRISTA.

LARGE-FLOWERED SENSITIVE PEA.

NATURAL ORDER, LEGUMINOSÆ.

CASSIA CHAMÆCRISTA, Linnæus.—Stems rather leaning or spreading; leaflets eight to twelve or fifteen pairs, linear-oblong; flowers rather large; stamens ten, unequal. Stem one to two feet high, firm and sub-ligneous at the base, much branched, often purplish. Leaflets half an inch to near an inch long, minutely ciliate-serrulate, sub-sessile; common petiole about one-third of an inch in length below the leaflets, with a depressed or cup-like gland on the upper side. Flowers deep bright yellow (usually with purple spot at the base), in lateral sub-sessile fascicles above the axils of the leaves,—often in pairs, sometimes three or four. Legume about two inches long, hairy at the sutures. (Darlington's *Flora Cestrica.* See also Gray's *Manual of the Botany of the Northern United States*, Chapman's *Flora of the Southern United States*, and Wood's *Class-Book of Botany.*)

THE familiar name of Sensitive plant, in so far as it is applied to this species, is liable to mislead. There is but a very distant relationship between the Sensitive Pea and the sensitive plant of poetry. The species which suggested Shelley's beautiful verses, beginning,

"A sensitive plant in a garden grew,"

is the *Mimosa pudica*, a native of the more tropical regions of the American continent, and outside of the limit of the United States. Even in its sensitive features there is very little relation to the true sensitive plant, for its closing motion when touched is very faint indeed. The writer has often brushed severely against it, without being able to detect any of the irritability of its namesake, although after many minutes have elapsed the leaflets seem partially closed. If, however, a branch be plucked from the parent stem, the leaflets rapidly close. It has been a

question whether Longfellow had this plant in mind when in "Evangeline" he says:

> "As, at the tramp of a horse's hoof on the turf of the prairies,
> Far in advance are closed the leaves of the shrinking Mimosa."

It is doubtful whether the real mimosa has the very sensitive nature the legend implies, but it certainly could not be true of the *Cassia Chamæcrista*. Poets do not always draw their inspiration directly from nature. Their minds are influenced by what they have read, as the minds of many other people are. At any rate, in no way is our plant

> "Like the Mimosa shrinking from the blight of some familiar finger,"

as Whittier puts it; and only that it is as bad to change a name in general use as to give a misleading one in the first instance, it would hardly be worth while continuing its "sensitive" appellation. It has been called "Partridge Pea," but this name has been given to other plants, and is therefore still more misleading.

The botanical name, *Cassia* or *Casia*, in old works, is a very ancient one, and is met with in the writings of Dioscorides and Theophrastus; but, judging by the description of Pliny, the celebrated Latin writer, the plant that originally bore the name can scarcely be anything like our plant, and is believed by some authors to have been something akin to the sandal-woods. The name in connection with the present genus appears to have originated with Tournefort, as *Casse;* and with a slight change in orthography, was adopted by Linnæus, as we have it now. The specific name *Chamæcrista* was the generic name given to the plant by Rivinius, a botanist who flourished about the end of the seventeenth century, and before the binomial system was established. Thus, we still begin the name with a capital, which indicates that it once represented a proper or generic term.

The genus is an unusually extensive one, embracing, perhaps, three hundred species, and having representatives in every quarter of the globe but Europe. They are chiefly tropical, and it is probable that those which are found in the temperate

regions are immigrants from more southern climes, during the long ages past. Of the immense number that inhabit the American continent, less than a dozen have advanced into the limits of the United States; and some of these, as for instance *C. Occidentalis*, perhaps within comparatively recent periods. If, however, our *Cassia Chamæcrista* was originally tropical, it has become a famous traveller, for it has made itself at home in every part of the Union, east of the Rocky Mountains, up to Iowa, and Massachusetts. Prof. Porter, indeed, found it growing near Denver, where, in all probability, it ventured since the advent of civilization to Colorado, and it is a good illustration of its travelling capacities. It will, no doubt, soon establish itself in that hot region, for in the East it flourishes best in dry, gravelly, or sandy places, showing no signs of dissatisfaction, except that in the middle of very hot days the leaves droop a little, recovering, however, very soon after the sun's decline from the meridian. N. P. Willis, in his poem, "The Shunamite," says, that when Hagar went forth with Ishmael—

> "It was a sultry day of summer time,
> The sun poured down upon the ripen'd grain,
> With quivering heat, and the suspended leaves
> Hung motionless."

And had this scene been laid in the United States, our *Cassia Chamæcrista* would, undoubtedly, have been one to do justice to the poetry of that sultry day.

The specimen from which our drawing was made is of Massachusetts growth, and is very much smaller than when found further south; but it is selected as enabling us to give a complete plant on one plate. In the South it is very bushy and somewhat trailing; and it grows remarkably vigorous, even in poor, sandy soil. For this reason it has been used for sowing and ploughing down as a "green manure" in barren ground, and in this capacity has become quite famous. It varies very much in regard to the bushy or erect habit in different locations, and, indeed, in many other respects, chiefly in regard to the spots on the petals of the

flowers, and the hairiness or smoothness of the leaves and seed-vessels. In Pennsylvania and New Jersey the plant is very smooth in most cases. In Southern Illinois and Missouri the more hairy forms prevail. With all allowances for variation, it is, however, not probable that the colored plate No. 107, of the "Botanical Magazine," and named *Cassia Chamæcrista*, is really this species, as the shape of the seed-vessel, uniform through all the changes of other characters in our American plant, is very different in that drawing, as also are some other characters.

The family of *Cassia* has been celebrated through the medical properties of *Cassia acutifolia*, known in pharmacy as the Alexandrian Senna, and it is believed that our large-flowered Sensitive Pea partakes, in some degree, of the purging character of its relative.

EXPLANATIONS OF THE PLATE.—1. Upper portion of a Massachusetts plant. 2. The annual root. 3. Seed-vessel nearly mature, from a plant growing in Pennsylvania.

GYMNOGRAMMA TRIANGULARIS.

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GYMNOGRAMMA TRIANGULARIS.

CALIFORNIA GOLD FERN.

NATURAL ORDER, FILICES.

GYMNOGRAMMA TRIANGULARIS, Kaulfuss.—Fronds densely tufted, six to twelve inches long, dark chestnut-brown, glossy, nearly naked; fronds from three to four inches each way, deltoid; lower pinnæ very much the largest, deltoid, unequal-sided, the others lanceolate, deeply pinnatifid, with oblong obtuse lobes; texture sub-coriaceous, powdery varying from deep orange to white. (Eaton's *Ferns of North America;* and *Botany of Wheeler's Expedition.*)

T the end of the last century there were few large genera of ferns but *Acrostichum, Polypodium, Asplenium, Pteris* and *Adiantum.* But the number of species increased to such an extent that it became a matter of convenience as well as of a more perfect study to look for systems of classification which should unite only those forms that were structurally allied, and yet break up the overloaded genera as they were constructed at that time. The introduction of the natural system of Botany helped the study of classification, though indeed the ferns as they stood in the artificial system of Linnæus composed one of his most natural classes. Still with the introduction of the natural method, chiefly through Jussieu, the classification of ferns into genera was made dependent on little more than the form or position of the sori or fruit dots on the frond. Thus to have round sori made a *Polypodium,* in right lines an *Asplenium,* in marginal lines a *Pteris,* and in terminal sub-circles an *Adiantum.* It was at length found that the manner in which the fruit dots opened was uniform in evidently allied forms, and further that the manner in which the veins forked or were developed also had great similarity in groups that might be divided as separate

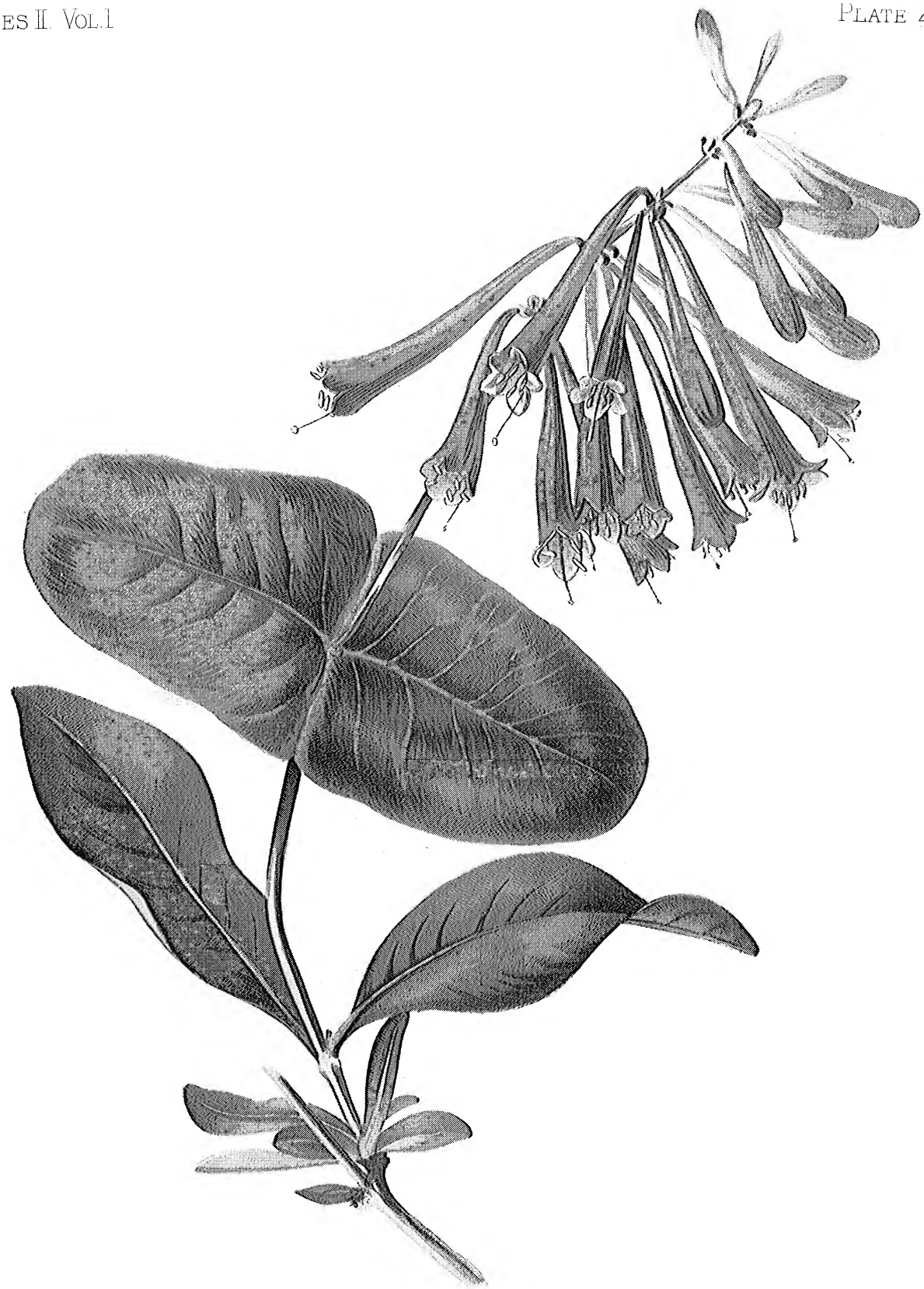
genera, and with some other characters of more or less importance the great family of ferns was divided into numerous genera, and their study much simplified in consequence. Still division has been carried further than sound dividing characters perhaps warrant,—certainly beyond the point that natural appearances in the species grouped into genera seem to demand; and while there have been over five hundred genera described by various modern authors, it is probable there are really but one-third of that number which would stand criticism from a truly natural point of view. Our genus *Gymnogramma* was taken from *Acrostichum* in 1811, by Desveaux, a celebrated French botanist of the early part of the century, and chiefly because the fruit was not only in right lines, but was characterized by the absence of an indusium or membrane, which usually seems to cover in part the sporangia. It was from this peculiarity that the name *Gymnogramma* was formed; *gymnos* being a Greek word for naked, and *gramma*, writing or lines; that is, the lines of fruit being naked. The species are somewhat numerous, but chiefly inhabit tropical regions. Only two enter the limits of the United States. Of these only our present subject has ventured far within its borders, and this is found from along the Pacific coast from Central America north to Vancouver's Island. It was first discovered, like so many other of our western species, by the Vancouver expedition, and named *Gymnogramma triangularis* by Kaulfuss, who described the ferns collected on this voyage in his "Enumeration Filicum," published in Leipsic in 1824. Our knowledge of it is therefore comparatively recent, and we are only now beginning to find that several supposed distinct species of various authors belong to it. Sir W. J. Hooker, in his "Species Filicum," says, "it is remarkably uniform in its form and ramifications," but specimens from different collectors in the herbarium of the Academy of Natural Sciences of Philadelphia, show the variations usual in well-known ferns. Mr. Nuttall has specimens from San Diego, California, which he thought deserving of a distinct specific name. He labels it *G.*

viscosa, and this Mr. Eaton, in a note attached to the specimen, proposes to retain as a varietal name. Specimens from the woods of the Columbia of what Mr. Nuttall seems to have regarded as the normal form have small and rather narrow fronds in proportion to the length of the stipe. Some specimens from Mrs. Elwood Cooper, of Santa Barbara, have fronds with stipes near a foot in length, and very broadly triangular outline, this somewhat triangular form suggesting its specific name. In specimens collected by Dr. Edward Palmer from Guadalupe Island, off the coast of California, the stipes are not more than two inches long, with the frondose portion of about the same length. In this, as in many other species of *Gymnogramma*, the under surface is covered by a powdery exudation, and this varies in the specimens in the herbarium cited from deep golden yellow in Mrs. Cooper's specimen to silvery in those from much farther north.

Many ferns prefer wet places, while others seem as well fitted especially for dry situations. Though this species would be included in the latter class, it is not insensible to the advantages of moisture. Dr. C. C. Parry, who collected it in California, once told the writer of this chapter that it grew in great abundance in the shelter of rocks and edges of ravines, where it could be well moistened by the early winter rains. In southern California he usually found it growing in matted clumps, with fronds of various sizes and degrees of development according to the season or location, all coming up among the remains of stalks of previous seasons. In dry weather they all curled up and exhibited little but the yellow powdery under surfaces, and from these it takes its common name of "Gold fern" in California. Another friend, Dr. C. L. Andrews, of Santa Cruz, writing of the ferns of that part of California, also refers to its moisture-loving propensities as a condition of growth. He says, "*Gymnogramma triangularis* is found in all shady places where there are cliffs, some moisture, and a rocky debris with vegetable mold. It clings loosely to the soil, and grows where mosses and liver-

wort abound. It seems to grow largest in sandy earth among decaying leaves. In summer and fall (our dry season) the leaves curl up into little balls. But with the first rain they seem as fresh as ever, probably from a new growth." These facts will very much assist those who may endeavor to cultivate it.

EXPLANATIONS OF THE PLATE. 1. A full-sized plant. 2. Under surface of mature frond. 3. Enlarged pinnule, showing arrangement of the sporangia. 4. Pinnule, showing the upper surface.



LONICERA SEMPERVIRENS.

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LONICERA SEMPERVIRENS.

SCARLET TRUMPET HONEYSUCKLE.

NATURAL ORDER, CAPRIFOLIACEÆ.

LONICERA SEMPERVIRENS, Aiton.—Leaves oblong, evergreen, the upper ones connate-perfoliate; flowers in nearly naked apikes of rather distant whorls; corolla trumpet-shaped, nearly regular, ventricose above. Stem woody, twining in the same direction with the sun. The distinct leaves in the wild plant are elliptical or almost linear; the connate ones but one or two pairs. Corolla of a live scarlet without, and yellow within. (Wood's *Class-Book of Botany*. See also Gray's *Manual of the Botany of the Northern United States*, and Chapman's *Flora of the Southern United States*.)

UNDER the names of Honeysuckle and Woodbine there are perhaps few families of plants better known through the works of the poets and other polite writers. All who refer to them have generally united in regarding them as emblems of affection, and any allusion to them in poetry is usually in connection with this sentiment. Joaquin Miller, in "First Love," describing the memory of an early passion, says:

> "She stands as she stood in the glorious Olden,
> Swinging her hat in her right hand dimpled;
> The other hand toys with a honeysuckle
> That has tip-toed up and is trying to kiss her."

But much of the poetry of the Honeysuckle refers to its aid in giving the cosy character to an English cottage, and to the adornment of arbors and bowers. In his advice to young damsels, not to believe too easily what every wooer tells them, Thomson, in his "Seasons," says:

> "Nor in the bower,
> Where woodbines flaunt, and roses shed a couch,
> While evening draws her crimson curtains round,
> Trust your soft minutes with betraying man."

Nearly all our own poets, when they refer at all to the Woodbine or Honeysuckle, keep this embowering character especially in view. Bryant, in the "Unknown Way," asks of the strange path—

> "Goest thou by nestling cottage?
> Goest thou by stately hall,
> Where the broad elm droops, a leafy dome,
> And woodbines flaunt on the wall?"

and, in the "Evangeline" of Longfellow, we are told that—

> "Firmly builded with rafters of oak, the house of the farmer
> Stood on the side of a hill commanding the sea; and a shady
> Sycamore grew by the door, with a woodbine wreathing around it."

It must be confessed, however, that our poets have either had their imaginations influenced by European literature or by European experiences, for our native species have not the rampant habit of the European, and most of the honeysuckles and woodbines of American horticulture, which help us to make umbrageous bowers, come to us from China or Japan; and when we see the woodbine on the American "nestling cottage," we have little but the name to connect them with the plants of which the poets sing. But the names carry us back a long way into history. By the ancient Greeks and Romans, as we learn from Pliny, the Honeysuckle was known as the *Periclymenon*. Literally, this is "rolling or twining around," and is equivalent to the modern Woodbine. Honeysuckle seems a puzzling word to modern investigators. Dr. Prior says, in his "Popular Names of British Plants," that the name probably belonged to some other plant, and was "transferred to the woodbine on account of the honeydew so plentifully deposited on its leaves." But the account given by Green, the old English herbalist, seems to offer a better reason. He says: "In the evenings some species of sphinges, or hawk-moths, are frequently observed to hover over the blossoms, and with their long tongues to extract the honey from the very bottom of the flowers. A considerable quantity of the nectareous juice may sometimes be discerned in the tube. Insects that are

too large to penetrate into the narrow part of the tube, and have not a long tongue like the sphinges, to reach the juice, make a puncture towards the bottom and so fairly tap the juice." It may be remarked here that the word "Honeysuckle," by all the earlier writers, seems to have been confined to the flowers of the Woodbine plant.

"A honeysuckle,
The amorous woodbine's offspring,"

as Ben Jonson expresses it, and this would leave Dr. Prior's explanation quite out of the question. It is worthy of remark, by the way, that Green notes the habit of the larger insects of boring into the corolla from the outside, an insect-practice supposed to be among the discoveries of these modern days.

Another name of somewhat ancient times was *Caprifolium*, and this has been taken as a name for the whole order—*Caprifoliaceæ*. In like manner this name puzzles the commentators, and is thought to be derived from Latin words signifying a goat and a leaf, "because goats are fond of the leaves." This is an unlikely reason. A popular name for the Woodbine among some of the English peasantry who know nothing of Latin is "Caprifoly;" and it is probably, therefore, a corruption from some forgotten source.

The botanical name, *Lonicera*, credited to Linnæus in our text-books, seems to have been first applied by Ray, a noted English botanist who flourished towards the end of the seventeenth century; and it commemorates Adam Lonitzer, who wrote several large folio volumes on the medical properties of plants which were published in Frankfort between 1551 and 1564. He was born at Marbourg in 1528 and died in Frankfort in 1586. The name appears in Plumier's works in 1703, and he is often credited with the authorship of the name.

Independently of its family history and generical associations, our Trumpet Honeysuckle has abundant points of its own to interest the student and the mere lover of wild American floral scenery. There is scarcely anything more lovely than this species when it gets a chance to clamber over low bushes on the outskirts of

woods. It is very often found, however, in the deeper shade, and then its flowers are few. In these cases, even in Pennsylvania where it is occasionally found, its trailing stems retain the leaves green all the winter, though Dr. Gray says "leaves deciduous in the North," referring probably to cultivation. The plant is not found wild beyond Southern New York, whence it extends down to Louisiana and Florida, and Mr. Butler, in the first volume of the "Botanical Gazette," notes that it is found across the Mississippi in Arkansas. Usually it favors low, moist places, but Mr. Howard Shriver, in the same magazine, states that it is found on cliffs of the New river in Virginia. Most of the species of Honeysuckle have the mouth of the corolla divided into two distinct portions or "lips;" our species is peculiar in having the mouth but slightly notched, and the divisions mostly regular. It is from this that it derives its name of "Trumpet Honeysuckle." From its bright color it is also called quite frequently the "Scarlet Coral Honeysuckle." It will be interesting to compare the manner of flowering with that of many other species of Honeysuckle. In some the leaves as well as the flowers are perfectly formed at each node. The flowering is then said to be axillary. In our species the leaves are nearly or entirely suppressed, and this makes the flowering appear in terminal racemes. It is further remarkable that in the case of those species which have this terminal character the upper leaves generally unite, and often increase in size. We may also note that when this union occurs there is much difference in the veining of the leaves, and this gives color to the view of some German morphologists that it is the growth of the leaf-blade that decides the number and position of the veins, and not that the veins are first formed as if they were the skeleton, the leaf-blade in form and character being then made to suit the veins.

CHELONE GLABRA.

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CHELONE GLABRA.

TURTLE-HEAD.

NATURAL ORDER, SCROPHULARIACEÆ.

CHELONE GLABRA, Linnæus.—A foot or two feet (or in Illinois six to seven feet) high; leaves from narrowly to rather broadly lanceolate (four to five inches long, four to twelve lines wide), gradually acuminate, serrate with sharp appressed teeth, narrowed at the base into a very short petiole: bracts not ciliate: corolla white, or barely tinged with rose, an inch long. (Gray's *Synoptical Flora of North America.* See also Gray's *Manual of the Botany of the Northern United States*, Chapman's *Flora of the Southern United States*, and Wood's *Class-Book of Botany.*)

THIS very pretty wild flower will interest the collector, not only because it is pretty, but also because it will furnish material for good botanical lessons, especially in that part of botany which deals with the evolution of form and the relation which plants bear to one another in systems of classification. Taking this latter topic first, it may be well to assume that a large number of our readers know what is a *Pentstemon*, for they form not only a very extensive genus, but some one or more of them are found in most parts of the territory covered by our work—the United States. Besides this, the *Pentstemon* has been improved by skilful florists, and thus has become a very popular garden plant, and afforded many besides those who go out to gather wild flowers, the opportunity of being acquainted with them. The natural order to which the *Pentstemon*, *Chelone*, and many other American plants belong, *Scrophulariaceæ*, has usually two pairs of didynamous or twin stamens, one pair generally above the other; but occasionally some of the number are abortive and only two stamens appear. On the other hand, there is at times a tendency to add to the normal number four, by the introduction of a fifth stamen. In *Pentstemon* this fifth

stamen is produced to the length and of the strength of the four perfect stamens, though we can see it has still imperfect anthers; but the fifth in this family being so conspicuously prominent, even to this extent, earned for the genus its botanical name Pent- (or fifth) stemon. Now, our present subject, *Chelone* (pronounced in three syllables), is much like *Pentstemon* in this respect, though, while the fifth or imperfect stamen is developed to the full length in *Pentstemon*, it is much shorter than the other four in our present subject, and botanists dwell much on this in noting the differences between the two. There are also some little differences in the peculiar compression of the corolla in *Chelone*, and in the general appearance; and, after all, it is a question whether it is not rather because of the general appearance of the plant and flower that it is kept separate from *Pentstemon*, for very few persons, unacquainted with the niceties of botanical classification, would at first take it for a *Pentstemon*. There is, however, one little point which seems characteristic and sufficient to decide them, and that is in the seed, which has always around it a broad membraneous wing, never to be found in *Pentstemon*, so that this, with the general distinct appearance, might be relied on to distinguish. But even the general appearance is not always to be relied on, for the "Botany of the Californian Geological Survey" tells us that there is a plant in Oregon so exactly like a *Pentstemon*, that one has to note the membraneous border to the seeds before knowing that it is a *Chelone*. On the other hand, there are some *Pentstemons* that have been thought to be *Chelones*, and the whole teaches us on how slender foundations often stand what we think are very distinct genera.

As to how one form may grow out of another, a hint may be gathered from a communication by Mr. Henry F. Young to the Bulletin of the Torrey Botanical Club for 1872. As already noted in *Chelone*, the fifth or false stamen is much shorter than the others, but Mr. Young found a flower in which were five perfect stamens. This is a very important fact as showing the line of descent. In this genus and most of its allies the calyx is five-

parted; and the corol'a, though of but one petal, is also usually five-lobed. This shows that the normal structure of the flower is pentamerous, or formed on a plan of five, and that it is only by a union or suppression of parts that we have the forms we see. Even when we come to study the species as well as the genus, the relation of one form to the other is found so close as to make the line of distinction very uncertain. In the earlier times Linnæus described two species. One, our present *Chelone glabra*, is thus described by Willdenow, "leaves lanceolate, serrate, petiolate; the upper ones opposite." The other *C. obliqua* is said to have "leaves lanceolate, serrate, petiolate opposite." It is not surprising, therefore, that succeeding botanists were in doubt about them. Professor Wood does not refer to *C. obliqua* even as a synonym, as Dr. Chapman in his Southern Flora, and Dr. Gray in his Manual of 1867, do,—but the latter in his "Synopsis" of 1878, again carries it back to its Linnæan position as a distinct species, giving a character not mentioned by Willdenow, that in *C. obliqua* the bracts are "ciliolate," while in our species he says they are "not ciliate," meaning perhaps "ciliolate," or having a few short or scattered bristles along the margins of the bracts, which are probably variable after all. Lindley and Moore's Treasury of Botany says, "The so-called *C. glabra* is now regarded as but one of the forms of *C. obliqua*," but if one name has to be dropped, it should be the latter in accordance with the practice of American botanists. A. L. de Jussieu, a distinguished French author of the end of the last century, and one of the fathers of modern Botany, tells us *C. glabra* was the earliest name, and that the character of the whole genus was drawn from this species. That the species has "many forms" American botanists know. Mr. Coleman finds one in the Southern Peninsula of Michigan with leaves only between a quarter to half an inch wide, which he calls variety "linifolia." The flowers are also variable in color. It is often pure white, and again it is frequently found of the rosy tint we have given in our plate, which is from a Pennsylvania specimen.

Linnæus is usually credited with the name, but he tells us he adopted it from Dillenius, an author who flourished just before his own time. Tournefort, however, seems to be the original author, who wrote about 1700, and who, according to Milne, named it *Chelone*, "from the Greek, meaning a tortoise, from the figure of its seeds, which are round, compressed, and begirt with a membraneous rim or border." Clayton, and others of his time, regarded it as one of the *Digitalis* or Fox-gloves; though Gronovius, the editor of Clayton's work, refers it correctly to Tournefort's *Chelone*.

Lindley and Moore, already quoted, say, comparing it with *Pentstemon*, "the form of the corolla in this genus is very distinct, the broad-keeled upper lip and scarcely open mouth giving it some resemblance to the head of a tortoise or turtle, to which feature are due both the scientific appellation and the popular American name of 'Turtle-head.'" Our American botanists do not seem quite sure about this. Professor Wood, after giving the Greek name, simply says, "from the appearance of the flower," and Dr. Gray, though he translates the Greek to "tortoise," adds, "the corolla resembling in shape the head of a reptile," which may include many things besides a tortoise. The peculiar-looking seed, as already noted, is the chief distinctive mark between *Pentstemon* and *Chelone*, and as this must have been in mind by the botanist describing it, gives some reason for concluding Milne to be right as to the original intention of the name. The "American common name" probably came from the botanists, for we have rarely heard those who live among the flower give it any name.

Dr. Gray says it grows "from Newfoundland to the Saskatchewan and south to Florida." It is across the Mississippi, however, in Arkansas, though it has not been found in Kansas or Nebraska. It bears garden culture well. Among the common names given in books are "Snake-head," "Shell-flower," and "Balmony."

TOWNSENDIA SERICEA.

L. PRANG & COMPANY, BOSTON.

TOWNSENDIA SERICEA.

SILKY TOWNSEND FLOWER.

NATURAL ORDER, COMPOSITÆ.

TOWNSENDIA SERICEA, Hooker.—Stemless, from a simple or much branched caudex, one to two inches high; leaves spatulate-linear, silky canescent, acute, one-nerved, twelve to fifteen lines long, erect, surrounding and partly concealing the heads (eight lines long), which are sessile or on very short peduncles; scales of the involucre subulate-lanceolate, pubescent, green in the centre, purplish towards the tip; margins scarious, lacerate-ciliate; rays long; narrow, not spreading; pappus of the disk white, about as long as the corolla, pappus of the ray of several unequal subulate bristles, much shorter than the achenium and one or two long ones (sometimes nine or ten) similar to those of the disk flowers; achenium hairy, hairs minutely capitate. (Porter's *Synopsis of the Flora of Colorado.* See also Torrey and Gray's *Flora of North America.*)

SINCE the railroad progress of the few years past has brought the Rocky Mountain country so near to us, and many of the most intelligent class of tourists make Colorado their summer home, the desire to become acquainted with its natural history and especially its botany is very great. Its flora is indeed interesting, not merely for its own sake, but also because its Alpine vegetation affords us in some degree a knowledge of a more northern flora. The present species for instance, an inhabitant of the Rocky Mountains, is also an Arctic plant, and was indeed first made known to us by the naturalists connected with the first voyage to the Arctic seas, of the subsequently unfortunate Sir John Franklin; and it is described in Dr. John Richardson's account of the plants collected on that expedition, published in 1823. Dr. Richardson thought it might be a species of *Aster*, to which it is somewhat related, occupying a position between *Aster* and *Erigeron.* Its true distinction from *Aster* was perceived by Sir William J. Hooker, who, in 1829, published the

"Flora Boreali-Americana," wherein he described and named it as *Townsendia*. Its general appearance leads one to suspect some difference from *Aster;* and the globular involucre (Fig. 2) strikes us at once when we go into details, as in *Aster* it is ovoid or oblong. Some authors note a difference in the relative length of the pappus in the ray and disk florets, it being shorter in the latter. Dr. Masters, in the "Treasury of Botany," says of *Townsendia*, "the fruits are hairy, and the pappus is in one row, scaly in the outer, hairy in the inner fruits." The difference in the pappus seems to be the great point of comparison. Sir W. J. Hooker says, in the work referred to: "This highly interesting plant, no less on account of its habit than its pappus, deserves to be separated from *Aster*, of which it was by Richardson considered a doubtful species." When speaking of the pappus particularly he says: "Pappus of the ray composed of several unequal subulate bristles much shorter than the achenium, and one or two long ones nearly resembling those of the disk flowers." In regard to this matter of the pappus Nuttall says, in the "American Philosophical Society's Transactions" for 1834–35, "Achenium obovate, margined, and flatly depressed, sericeous (silky) with a numerous connate series of white silky pappus almost plumose, barbellate, and remarkably attenuated above."

We have thought it important to call the collector's attention to what these different authors say of the pappus (the silky hair coming up from the tip of the seed at *p* in Fig. 3 and Fig. 4), because it will be seen that though there is something evidently distinct in its characters from *Aster*, no two of the writers exactly agree, and our Fig. 3 and Fig. 4 would scarcely be recognized as coming under the description of any one. The bristles "much shorter than the achenium" do not show at all; rather, instead of "one or two" being long in the ray flower (Fig. 3), they are all "resembling those of the disk" (Fig. 4); being but little shorter. Our drawing was made from a Colorado specimen, kindly furnished by Prof. Sargent, of the Cambridge Botanical Garden, but the same character as figured in our plate exists in

dried natural specimens. We were at first disposed to regard this development of the pappus in the ray flowers abnormal in this respect,—but it may be noted that in Mr. Watson's Botany of King's Expedition, a species *T. scapigera* is figured, in which also there seems nothing but a little difference in length to distinguish the pappus of the disk from that of the ray.

Our plant would probably be regarded as the same with that described in the "Bulletin of the Torrey Botanical Club," vol. 6, p. 163, as *T. Wilcoxiana*, by Prof. Wood, who says of it, "pappus alike in the ray and the disc florets, consisting of about thirty white bristles," and he remarks that it is confounded in Herbariums with *T. sericea*. Since the discovery of the species we now describe by the Franklin expedition, so many new forms have been found from the Arctics to New Mexico, and so nearly like each other, that botanists are almost afraid to name and describe them as new species, and, therefore, we have thought it might help the student, by dwelling on this point relative to the pappus, to prepare him to look for probable variations.

Among the interesting points connected with our plant is one quoted by Hooker in regard to the time when the buds are formed. In most composite plants these are developed after the growth of the leaves in the spring; Sir W. J. Hooker says "the bud is formed in the autumn," and what Dr. Richardson further observed in the living plant I find to be characteristic of all the specimens in this collection, that "the florets of the ray are mostly involute, rarely expanded, and always narrow, nearly of the same color with the pappus and inconspicuous; the flowers indeed never fully expanding," in which again the student will see some differences in our plate.

Though with apparently so wide a distribution through the centre of our territory, it does not seem to be often met with by collectors. It was found by Nuttall, in 1834, when on the Wyeth expedition, he says "on the Black Hills towards the source of the Platte in latitude 41°. Flowering in April and May probably, as, according to Dr. Richardson, the flower is formed in the autumn

and expands the following spring." Dr. C. E. Parry found it in 1861 in the Rocky Mountains, about the head waters of South Clear Creek; and about the same time and near the same place it was found by Hall and Harbor. Mr. Brandegee has collected it in southern Colorado, and as already noted it has been found in the Indian Territory, if Prof. Wood's *T. Wilcoxiana* is the same thing.

Townsendia was so named by Sir W. J. Hooker in honor of David Townsend, cashier in the same bank in West Chester, Pennsylvania, of which the celebrated Dr. Darlington was President, and who, though he wrote nothing, was one of the best botanists of his time, and had an especial knowledge of *Asteraceous* plants. In this especially, as well as for a free distribution of specimens to European botanists, they were glad in this pleasant way to make acknowledgments. He died at West Chester, Pennsylvania, December 6th, 1858, in his seventy-first year; preceding but by a few years his life-long friend and companion, Dr. Darlington, who died on the 22d of April, 1863, in his eighty-first year—the two having rendered West Chester famous in the botanical annals of America, and both being commemorated in distinctively American plants which bear their names.

EXPLANATIONS OF THE PLATE. 1. A full-sized plant. 2. Side view showing the almost globular involucre. 3. Ray floret with pappus and young achene enlarged. 4. Enlarged disk floret. 5. Pollen grain enlarged 270 times. 6. Side view of a branch, with side view of flowers, showing its proportionate length with the leaves.

POLYPODIUM FALCATUM.

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POLYPODIUM FALCATUM.

SICKLE-LEAVED POLYPOD, OR LIQUORICE FERN.

NATURAL ORDER, FILICES.

POLYPODIUM FALCATUM, Kellogg.—Frond deeply pinnatifid, segments alternate, long lance falcate, alternate, acuminate, doubly serrate, upper and lower divisions smaller by degrees, terminating above in a long slender acumination. Sori numerous, twenty to twenty-four in two rows, one on each side of the mid-rib, rachis glabrous, from one to one and a half feet in height. Root compressed tuberculate, one-fourth to one-eighth inch broad, greenish russet color, branching laterally, radicles numerous, rhizoma often covered with scales. (Dr. Kellogg in the *Proceedings of the California Academy of Sciences*, for December, 1854; see also *Eaton's Ferns of North America.*)

IN a recent work on a curious order of water plants known as Chara—"Characeæ Americanæ"—the author, Dr. Allen, quotes a distinguished student of the lower orders of vegetation, Alexander Braun, as saying: "So long as I knew but few forms of the *Gymnopodeæ*, their distinction was easy, but when it became necessary to distinguish sixteen or eighteen forms, I concluded to consider them all varieties of a single species." This extract from one of the most celebrated of German botanists shows that even those who have penetrated the deepest into the mysteries of plant life have no definite idea of what determines a species. If some accident had destroyed all the individuals comprising a dozen of the intermediate forms, so as to leave only the extremes, we see that Braun would have regarded these extremes as distinct species; but because the intermediates had not been destroyed, and thus affording a chain of close relationships, they are all regarded as of one species.

Now most botanists have had the experience with ferns that Braun had with *Characeæ*. The less we know of any species the

more likely we are to make new ones. The ferns of the Atlantic States have been so well studied that any novel form is soon referred to some well-known species; but the ferns of the Pacific coast are not so well known, and thus when some peculiar-looking individuals are met with it is uncertain what the botanist will do with them. Our present plant is as yet one of these doubtful plants. It was first brought to notice by Dr. Kellogg, who exhibited specimens to the California Academy of Sciences, December 11th, 1854, from Mr. Swan, of Shoalwater Bay, Washington Territory, and who named and described it as *Polypodium falcatum* at the meeting following, December 18th. Next we find it in Professor Eaton's hand from specimens received from Lieutenant A. V. Kautz, of the United States army, who collected it in Southwestern Oregon. Professor Eaton seems not to have detected the identity of these specimens with Kellogg's description, and so gave it a new name and description as *Polypodium glycyrhiza* in "Silliman's American Journal of Science and Arts" for November, 1856 (vol. 22, p. 138), and not in July, as he states in his "Ferns of North America." Then the writer of this was furnished with excellent fresh specimens by Mrs. Fanny E. Briggs from LaCentre, Washington Territory, from which our drawing was chiefly made; and the only other record of any specimens that we have at hand is in the "check list of North American Ferns in Davenport Herbarium of the Massachusetts Horticultural Society," where specimens are reported as from "Oregon, 1875; and from Washington Territory, 1876, Joseph Howell." It will be seen from this how very little is known of this fern, and from this it comes about that some authors write of it as "probably a variety of *Polypodium Californicum*," others as "probably a variety of *Polypodium vulgare*," and others, as for instance Professor Eaton, as a distinct species. It is not our purpose to illustrate what may finally be considered mere varieties in our "Flowers and Ferns of the United States," as no doubt many of the Pacific forms will come to be regarded; so we give this because, with Professor Eaton, we believe its specific

distinctness will be finally agreed upon. It will be seen from our plate that it agrees with *Polypodium Californicum* in the pellucid veins which thicken as they terminate (Fig. 3, *a*). From *Polypodium vulgare* it differs in the thin, papery texture and glaucous hue of the fronds, and the falcate form of the divisions in the more vigorous specimens (Fig. 2). Beyond all this there is one very important difference if Professor Eaton's account under "*P. glycyrhiza*" be correct. As every fern collector knows, he has not to wait

> " . . . till the light of spring
> Comes from the sun, with zephyrs and with showers,
> Waking the earth to beauty, and the woods
> To music, and the atmosphere to blow,
> Sweetly and calmly, with its breath of balm,"

as Percival would say, before he can collect perfect specimens of *Polypodium vulgare* for examination, for it is an evergreen, and is even in best condition in the winter season if the frosts are not too severe and the place of growth too exposed; but this species Eaton says has annual fronds, and this from their thin, filmy character is probably correct. That it is nearer to *P. Californicum* than to *P. vulgare* we find also suggested by one of our own correspondents, Dr. C. L. Andrews, of Santa Cruz, California, who, under date of April 16th, 1878, says: "*Polypodium falcatum* I take to be a variety of our *P. Californicum* (*intermedium*), having the habit of *P. vulgare*." Of this habit Mrs. Fanny E. Briggs says in the *Gardener's Monthly* for March, 1879, "it grows in moss on trees and logs with *Polypodium intermedium*, and is known as 'Wild-Licorice.'" Lieutenant Kautz tells Professor Eaton that it has "aerial rootlets, having a sweet flavor like that of licorice." In his "Ferns of North America," and wherein he expresses his opinion that it is a distinct species, Professor Eaton says he "has not seen the root stocks."

Dr. Kellogg, in the original account in the "Proceedings of the California Academy of Sciences," says: "It is highly esteemed as a medicine, both among the natives and others, thought to be antisyphilitic, also used in the preparation of

tobacco, imparting to it a sweetish licorice flavor. The Polypody upon oak trees was famous among the ancients for the cure of melancholy and madness."

It is epiphytic on old decayed trees, stumps and roots, and clefts of rocks,—indeed we should imagine much as the *Polypodium vulgare* is. It probably grows rather stronger than the species last named. Mr. Lunzer, our artist, who was kindly permitted to examine a specimen under cultivation in the Cambridge Botanic Garden, Massachusetts, found some of the fronds with their stipes about eighteen inches long. The experience in this garden leads to the belief that the plant will adapt itself easily to cultivation, and the facts we have given in regard to its native locations will help the cultivator.

EXPLANATIONS OF THE PLATE. 1. A rather young plant from Washington Territory furnished by Mrs. Fanny E. Briggs. 2. A full-grown frond from a specimen grown in the Cambridge Botanic Garden. 3. Portion of pinnule enlarged, showing the position of the sori on the veins, and the thickening of the ends of the (pellucid) veins at *a*.